III. Affected Environment and Environmental Consequences

A. INTRODUCTION

Guanella Pass Road crosses 38.2 kilometers (23.6 miles) of mountain terrain between the towns of Grant and Georgetown, Colorado. The corridor begins in Park County and ends in Clear Creek County. Guanella Pass Road passes through Pike NF and Arapaho NF and passes by the Mount Evans Wilderness Area. Elevations along the road range from approximately 2,615 meters (8,600 feet) at Grant to 3,547 meters (11,669 feet) at Guanella Pass and then descend to 2,588 meters (8,512 feet) at Georgetown. Approximately 18.3 kilometers (11.4 miles) of the existing roadway has a paved surface, and 19.7 kilometers (12.2 miles) has a dirt/gravel surface. The existing roadway width varies from approximately 5.5 meters (18 feet) to 7.2 meters (24 feet).

Figure III-1 shows the project corridor and vegetation zones. The first 8 kilometers (5 miles) of the road, north of Grant, pass through upper montane and riparian forest as the road follows Geneva Creek, a tributary of the North Fork of the South Platte River. As Guanella Pass Road crosses the south end of Geneva Park, it passes through a subalpine forest at the lower elevation limit of approximately 2,918 meters (9,600 feet). The road follows the eastern edge of Geneva Park for 3.2 kilometers (2 miles) passing between an extensive rich fen wetland and montane grassland before climbing into another subalpine forest. Between station 12+000 and station 19+000, the road crosses subalpine forest and willow shrublands along the Duck Creek drainage while gaining 426 meters (1,400 feet) in elevation. Wet meadows occur intermixed with extensive willow shrublands between an elevation of 3,100 meters (10,200 feet) and 3,162 meters (10,400 feet). At station 19+000, the road enters an ecological transition zone formed by the upper limits of the subalpine forest, and traverses alpine tundra between station 21+000 and station 24+000.

The drainage divide at Guanella Pass separates the Geneva Creek watershed to the south and the South Clear Creek watershed to the north. The road descends into the subalpine forest at station 24+000, at an elevation of 3,465 meters (11,400 feet). The road continues its descent through the subalpine forest to an elevation of 3,283 meters (10,800 feet) at station 25+000, at which point it reaches the South Clear Creek Valley floor. Beyond this point, the road parallels the valley floor, which supports a mosaic of sedge meadow and willow wetlands mixed with beaver ponds and stream habitat. The road crosses South Clear Creek at station 28+000 and again at station 29+000. From this point, the road continues along the western edge of the South Clear Creek Valley between station 30+000 and station 33+000, while passing through an area of development that includes Xcel Energy's Cabin Hydro Power Generating Station, reservoir, and associated power lines; Clear Lake; and Green Lake.

The road crosses rock and talus fields and mixed stands of subalpine forest while descending along the western edge of the valley from an elevation of 2,979 meters (9,800 feet) at station 33+000 to an elevation of 2,614 meters (8,600 feet) at station 39+000, the northern end of the route at Georgetown.

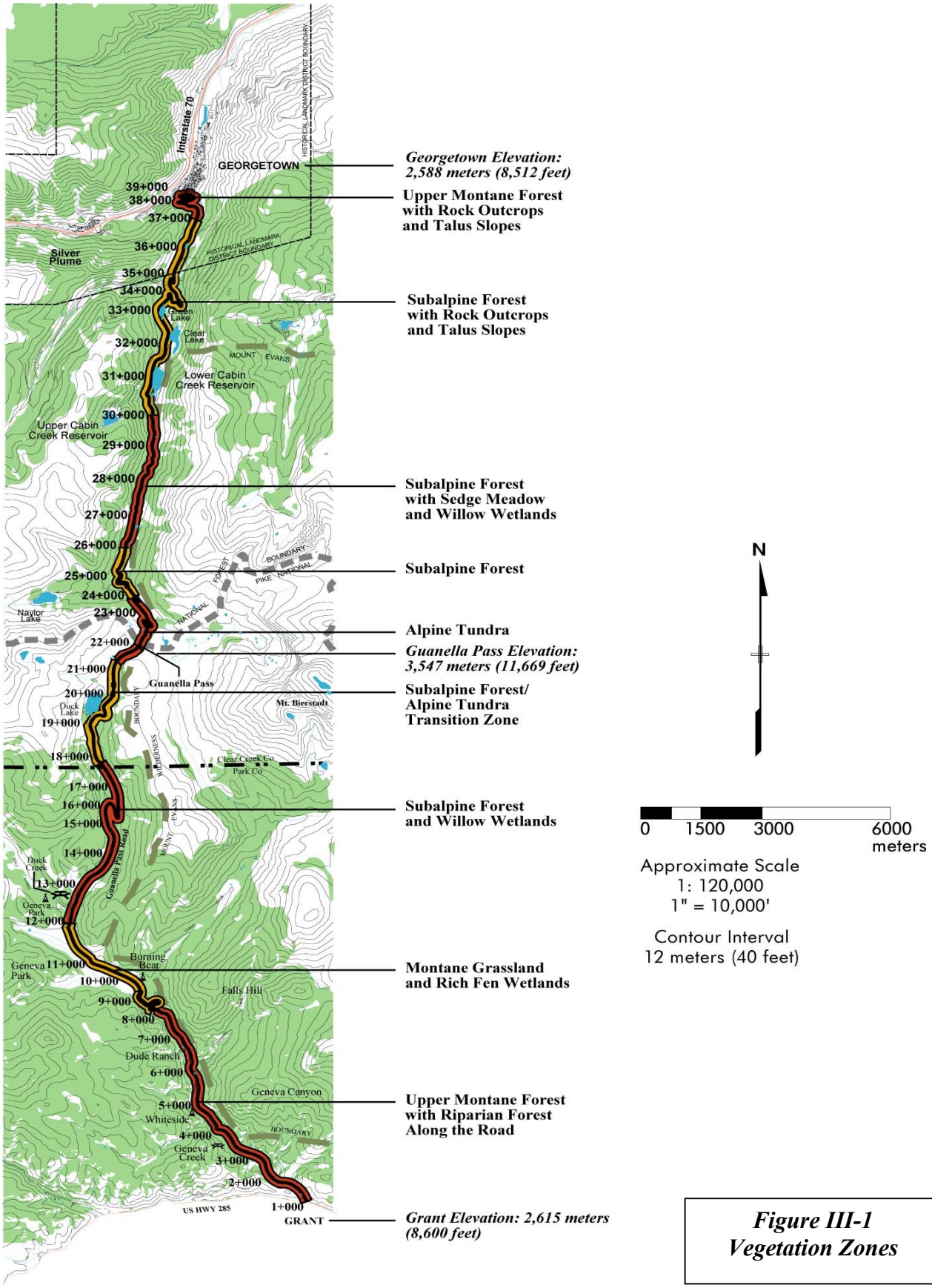


Figure III-1
Vegetation Zones

Mule deer, elk, and bighorn sheep winter range is crossed by the first 4.8 kilometers (3 miles) of Guanella Pass Road, north of Grant. Subalpine forest and alpine tundra provide habitat for Rocky Mountain goats, which occupy higher elevations east and west of the road. Beaver, black bear, bobcat, mountain lion, and a variety of small and medium-sized mammals are common and occupy montane habitats in the vicinity of the road throughout the year.

Riparian forest, shrub stands, and cliffs along Geneva Creek provide nesting habitat for songbirds, waterfowl, and birds of prey (raptors). Upper montane and subalpine forests and meadows crossed by the existing road provide breeding habitat for songbirds, waterfowl, raptors, and blue grouse.

Guanella Pass Road is designated as a Colorado Scenic and Historic Byway be the CDOT and as a NF Scenic Byway. The project area has many scenic views that are readily visible from Guanella Pass Road and are enjoyed by many travelers. Some of the highlights within the area include the site of the old Silverdale mining camp, numerous lakes, cascading waterfalls, Mount McClellan, Mount Bierstadt, and the Sawtooth Range. Visitors travel on Guanella Pass Road year-round enjoying the beauty of the changing seasons. In the fall, yellow and gold aspen contrast sharply with dark evergreen trees and rugged rock outcrops. During winter, the road is surrounded by snowcapped peaks and deep snow banks. In the spring, mountain wildflowers and wildlife emerge. During the summer, waterfalls and wildlife may be viewed.

Figure III-2 is a photo of the Guanella Pass environment taken north of the pass, looking southeast.

Figure III-2
Mount Bierstadt and the Sawtooth Range

There are many trails and historic wagon roads that are accessed from Guanella Pass Road. One of the most scenic routes accessible from the road is the Waldorf cutoff, which follows the Argentine Central Railroad roadbed to the top of Mount McClellan. From there, 176 mountain peaks are visible. These include Pikes Peak, Ouray Peak, Mount of the Holy Cross, Longs Peak, Mount Evans, and Mount Rosalie.

Details on existing conditions are found at the beginning of each section in this chapter. Both direct and secondary effects are included in the discussions of effect for each section where it is appropriate to do so. Direct effects result from the physical disturbance of construction. For example, direct effects include plant and tree removal, conversion of habitat, direct mortality by construction, construction noise, visual effects, nesting disturbance during construction, and reduced dust. Secondary effects are caused by increased traffic volume, higher speeds, and greater visitor use. Secondary effects include noise impacts (caused by increased traffic), increased roadkill, reduced sedimentation, economic impacts, effects to wildlife from increased dispersed recreation such as increased hunting and fishing pressure, habitat fragmentation, and area avoidance.

The evaluation of the impacts of the various Guanella Pass Road improvement alternatives was based on guidelines issued by the FHWA (Technical Advisory T6640.8A, 1987). The following impact categories were considered during the preparation of the FEIS:

- **Social Environment**
  - Community Character
  - Traffic Volumes
  - Population and Demographics
  - Local Economy
  - Land Use
  - Consistency with Local Plans
  - Cultural Resources
  - Traditional Cultural Properties
- **Water Resources**
  - Water Quality
  - Wetland and Riparian Communities
  - Other Waters of the U.S.
- **Visual Quality**
- **Recreational Resources**
  - Recreational Activities
  - Pedestrian and Bicyclist
- **Plants and Animals**
  - General Wildlife
  - Threatened, Endangered, and Sensitive Species
  - Management Indicator Species and Plant Communities
  - Fisheries
- **Construction Impacts**
  - General Construction
  - Construction Cost
  - Hauling
  - Materials Source Locations
  - Noise
  - Vibration
  - Traffic Delays
  - Economic Impacts
  - Reducing Construction Impacts
- **Other Resources**
  - Air Quality
  - Noise
  - Hazardous Materials
  - Section 4(f) Resources
  - Right-of-Way
  - Utilities
  - Floodplains
  - Farmlands
  - Environmental Justice
  - Services
  - Maintenance Cost
  - Cumulative Impacts
  - Relationship of Local Short-Term Uses vs. Long-Term Productivity
  - Irreversible and Irretrievable Commitment of Resources
  - Permits and Approvals Required

Most of the following discussions are summaries of technical reports prepared for this project. These reports are referenced at the end of each discussion. A list of all technical reports prepared for this project is contained in **Chapter VI: Availability of Technical Reports**. Some of the information in the technical reports may differ from that presented in this document where project information, design, or analysis have been updated.

B. KEY ISSUES

An extensive scoping process was undertaken for the Guanella Pass Road improvement project. During the course of the project, the scoping included a public survey, nine public meetings/hearings, public interviews, meetings with over 15 agencies, and a field survey. As a result of the scoping process, the project team identified the following six key issues for this project:

- Social Environment
- Water Resources
- Visual Quality
- Recreational Resources
- Plants and Animals
- Construction Impacts

Social Environment:

Members of the community have expressed concern over the potential impacts of the project. Their concerns focused on increased traffic volumes and speeds. The results of a community survey show that people came to live in the Guanella Pass area because of the area's natural beauty and historic character and that they do not want any of that to change. The respondents describe the community character as friendly, close-knit, and neighborly. Maintaining this character is important to many in the community. Some are concerned that Georgetown will lose some of its quaintness as a result of the improvements, and that the increased traffic will create problems including more crime, development, and noise. There are many historic sites within the Guanella Pass Road study area. The road traverses a historic landmark district at the Georgetown end. The selected alternative must minimize and mitigate any adverse impacts to the historic setting of the project area.

Water Resources:

There are several reservoirs, lakes, and streams within the project area. The water supply for Georgetown, Grant, and surrounding communities is also located within the project area. Streams and water bodies in the project corridor offer varying degrees of recreational opportunity from fishing to the quiet setting of a mountain creek. The water resources also provide a variety of habitats for fish, birds, and plants. Improving the existing quality of water is a high priority.

Visual Quality:

Guanella Pass Road is designated a Scenic and Historic Byway. The project area is known for its beauty. A major portion of the corridor parallels the western boundary of the Mount Evans Wilderness Area and provides scenic views of Mount Bierstadt and the Sawtooth Ridge. In addition, Guanella Pass Road traverses meadows of wildflowers and stands of conifer and aspen trees. Bighorn sheep, elk, and deer may be seen along the roadside throughout the corridor.

Ptarmigan can be spotted from the road at the alpine elevations. Improvements made to the corridor must retain the high scenic quality, and minimize and mitigate negative visual impacts.

Recreational Resources:

The majority of Guanella Pass Road passes through NF lands. This area is very popular for a variety of recreational activities including hiking, horseback riding, picnicking, camping, fishing, and viewing scenery and wildlife. Within the project area there are five campgrounds and three picnic grounds. Three major trailheads lead into the Mount Evans Wilderness Area. Several lakes and streams within the area provide fishing opportunities. Over 90 percent of trips on Guanella Pass Road are for recreational purposes. There are a number of mountain bike trails that access backcountry areas outside the Wilderness boundary. Recreational resources within the project corridor are an important component of the character and value of the area.

Plants and Animals:

The private and NF lands crossed by Guanella Pass Road and the adjacent water bodies provide habitat for a wide range of animals, birds, and fish as well as a variety of rare plants. Among these are several species listed as sensitive by the FS. The plants and animals are vital to the nature and wildness of the area and are to some people a primary reason for visiting the area. The FHWA is committed to taking all practical steps to minimize and mitigate impacts to the wildlife resources.

Construction Impacts:

The communities that inhabit the Guanella Pass project corridor have expressed concern over the impacts the construction will have on the sensitive environmental qualities of the area. This includes the historic district in Georgetown and Silver Plume, the Mount Evans Wilderness Area, the forest recreational opportunities, and wildlife in general. This FEIS evaluates the possible impacts associated with noise and vibration, traffic delays, material hauling and material source sites, and suggests ways to reduce such impacts resulting from construction activities.

1. Social Environment

Social impacts are changes in the social conditions in the project area attributable to the project. Social impacts relate to the citizens' attitudes, beliefs, and values. Gradual changes to a community are inevitable and are usually due to the growth and development of the community and that of nearby cities and towns.

1a. Community Character

Affected Environment

One of the main social elements of a community is the local perception of community character. Community character provides members a sense of identity and belonging. During the preparation of the DEIS, a survey was given to people within the Guanella Pass area to understand their perceptions regarding community character. The survey revealed that when people move to the Guanella Pass area, they tend to stay. The average length of residency for those living in Georgetown was 18 years. The average length of stay for residents along Guanella Pass Road was 20 years.

In the *Community Impact Survey Report* (MK Centennial, 1996), the participants' descriptions of the local community character focused on four elements. These elements consist of: 1) the unspoiled quality of the nearby natural resources; 2) the quaint, "small-town" nature of the area that provides for a close-knit and neighborly atmosphere; 3) the peace and quiet of the area; and 4) the historic resources along Guanella Pass Road and in Georgetown.

Environmental Consequences

In the *Community Impact Survey Report*, many of the participants were concerned that if Guanella Pass Road were improved the community character would experience long-term impacts in a number of ways. Of primary concern was that the road improvements would make the area more attractive to tourists and recreational users, thereby increasing the use of the area. Most of the participants expressed the concern that this increase in use would impact the above four elements of community character in the following ways:

- A number of the participants believed that the increased use would spoil nearby natural resources through increased pollution and damage to wildlife and habitats.

- Most of the participants expressed concern that the "small-town" nature of the area would disappear and be replaced by overcrowding, commercialization and development, and an increase in crime.

- Some stated that the peace and quiet would eventually be lost to the noise and pollution of traffic congestion caused by too many tourists coming to visit the area.

- Many participants also expressed concern that there would be more trash and damage to the historic as well as natural resources along Guanella Pass Road.

Comments received on the DEIS and the SDEIS also expressed concerns regarding short-term impacts to the community character resulting from construction activities. There is concern that construction hauling through Georgetown would exacerbate already crowded streets in the summer, that vibrations created by the construction trucks would damage the historic structures in Georgetown, and that construction trucks traveling through Georgetown's historic setting would diminish the historic and quaint character of the town.

Others expressed concerns that construction of the road itself would diminish the peace and quiet of the nearby recreational and wilderness areas as well as frighten wildlife from the area.

While not all participants perceived the proposed Guanella Pass Road improvements to result in negative effects, the perceived positive effects focused more on economic benefits, less dust, and improved safety rather than on any positive effects to the community character.

Since all of these concerns are based on increased use, the analysis of effects will focus on the increase in traffic. The effects analysis regarding community character is separated into short-term (construction-related) and long-term (post-construction) impacts.

Alternative 1

Long-Term Effects to Community Character

Although Alternative 1 (the No Action Alternative) consists of no improvements being made to Guanella Pass Road, there is still projected to be a 56 percent increase in traffic over year 1995 values by the year 2025. This projected growth is due to projected population increases in the Denver metropolitan area and along the front range of Colorado. As a result, even if Guanella Pass Road remains unimproved, there will still be an increase in traffic that could affect the community character in the ways discussed above. Due to the lack of formalized parking along the road, traffic congestion could become a greater problem given that there are few barriers preventing people from parking along the roadside. Based on this 56 percent increase in traffic, future associated traffic noise levels are estimated to increase by between one and three decibels within 30 meters (98 ft) of the road.

Short-Term Effects to Community Character

There would be no short-term impacts resulting from Alternative 1 given that there would be no construction for this alternative.

All Build Alternatives

Long-Term Effects to Community Character

Alternatives 2, 4, and 5 are projected to cause an additional 40 to 80 percent increase in traffic at the Pass over the year 2025 No Action Alternative projected increase. For Alternative 3, traffic at the pass is projected to increase 35 percent over the year 2025 No Action Alternative. Given the reduction in roadway design, Alternative 6 is projected to have the least amount of traffic increase, 20 percent, over the year 2025 No Action Alternative projected increase at the Pass. For further information on traffic projections please see **Chapter III.B.1b: Traffic Volumes**.

It is likely that all of the above projected traffic increases would impact the existing traffic conditions in the Town of Georgetown. It should be kept in mind that the majority of the increase in traffic over 1995 levels occurs regardless of whether improvements are made to Guanella Pass Road. Alternative 6 would have the least amount of additional impact on traffic congestion given that it is projected to have the least amount of traffic increase over the year 2025 No Action Alternative. Based on the Town of Georgetown's request, the FHWA plans to construct a bridge on Seventh Street over Clear Creek between Argentine and Brownell Streets. While the primary purpose for this bridge is to accommodate construction hauling traffic, the bridge also is a part of *The Town of Georgetown Comprehensive Plan* (2000) to help improve regular traffic flow and relieve visitor traffic congestion within the Town. For further information on this proposal please see **Chapter III.B.6c: Hauling.**

Though there would be more traffic on Guanella Pass Road, the reconstructed road is designed to better accommodate the projected increase in traffic. The proposed parking areas and the road are designed to minimize congestion on the road and in the recreational areas by controlling the number of vehicles that may park in specific areas and preventing individuals from parking on the road shoulder.

Based on the projected increase in traffic, noise associated with the increase in traffic is estimated to increase for Alternatives 2, 4, and 5 by between three and five decibels within 30 meters (98 ft) of the road. For Alternatives 3 and 6, projected increases in traffic noise ranges between one and three decibels. Increases for Alternatives 3 and 6 are, in general, no different than what is expected for Alternative 1. None of the decibel increases for Alternatives 2 through 6 cause the total noise levels associated with the projected traffic levels to exceed 57 decibels, the level set by the FHWA as the criteria to implement noise reduction for lands on which "serenity and quiet are of extraordinary significance." For further information see *Construction Noise Report for the Guanella Pass Road Improvement Project* (Hankard Environmental, November 2001).

Other long-term effects resulting from an increase in traffic (increased damage to wildlife, habitats, and ecosystems; more trash; more crime; more development), depend on a variety of factors, not just improvements made to the road. Such factors include, but are not limited to, local zoning ordinances, budgets, local and Federal land management policies, and the effectiveness of local law enforcement. Because these factors lie outside of the FHWA's jurisdiction and many of them depend on unknown future circumstances (legislation, funding), the FHWA is unable to objectively quantify or subjectively discuss these effects in any meaningful way.

Short-Term Effects to Community Character

Construction activities will have a short-term impact to the perceived community character. Large, heavy, mechanized equipment required to perform the improvements proposed in any of Alternatives 2 through 6 would be out of character with the typically rustic and rural nature of the roadway. In general, operation of such machinery will create noticeable increases in noise levels on lands less than a mile from the construction activities. As a result, users of recreational areas within a mile of the construction activities will most likely hear construction noise. Noise levels range from generally audible to not noticeable depending on the construction activity being performed, the existing noise levels, and the surrounding vegetation. The noise and human activity at the construction sites may cause some wildlife species to avoid the area for the duration of the construction. For further information see *Construction Noise Report for the Guanella Pass Road Improvement Project* (Hankard Environmental, November 2001).

Construction hauling through the Town of Georgetown may contribute to an increase in traffic congestion during road construction activities. Alternative 2 is anticipated to have the greatest amount of construction traffic hauling through the Town of Georgetown and Alternative 6 is anticipated to have the least amount of construction hauling traffic. To minimize construction hauling impacts to the Town's community character, the FHWA has identified two material sources along Guanella Pass that will be used to supply most of the needed aggregate for the project. Use of these material sources reduces the number of truck trips through the Town of Georgetown by over half. For more information on material source sites please see **Chapter III.B.6d: Materials Source Locations.**

The FHWA had also proposed a temporary construction bypass bridge to route construction traffic around a large portion of the Town of Georgetown's residential and business districts. Due to ROW concerns Georgetown rejected this proposal. Instead, the Town of Georgetown requested that the FHWA consider directing the remaining construction truck traffic over a new bridge on Seventh Street, to be constructed by the FHWA, and then route traffic up either Rose or Argentine Street depending on the size of the vehicle. The proposed permanent bridge is

included in Georgetown's Comprehensive Plan. Based on preliminary field reviews of the proposed bridge location, the FHWA believes that this is a feasible option and plans to pursue this haul route.

Based on the concerns expressed by Georgetown residents and businesses, the FHWA conducted a vibration study in October 2001 to determine the severity of vibrations that would be produced by fully loaded construction trucks, and to assess whether these vibrations would have any effect on the historic structures in Georgetown. Based on this study it was determined that fully loaded construction trucks did not produce vibrations severe enough to adversely impact the structural integrity of the historic structures. For further information refer to the report *Nondestructive Testing Investigation – Vibration/Noise Measurement Study – Construction Traffic Through Historic District, Georgetown, Colorado* (Olson Engineering, October 3, 2001).

1b. Traffic Volumes

Affected Environment

Existing traffic volumes along Guanella Pass Road were recorded between August 1994 and August 1995. Because of its primarily recreational use, Guanella Pass Road receives most of its traffic between Memorial Day and aspen leaf viewing season in the fall. These traffic volumes are expressed in weekend SADT. The weekend SADT is the average number of vehicles traveling the road over a weekend summer day. The 1995 weekend SADT south of Georgetown was 1,100 vehicles per day. The non-seasonal (winter) traffic volumes were approximately 75 percent lower than the seasonal traffic volumes.

Environmental Consequences

Alternative 1

Due to the continued population growth of the Front Range and surrounding areas, traffic volumes along the length of Guanella Pass Road are expected to increase approximately 56 percent over 1995 traffic volumes by the year 2025 if Alternative 1 (the No Action Alternative) is selected. This increase assumes a 1.5 percent annual growth rate[1].

Alternatives 2, 4, 5

Alternatives 2, 4, and 5 all involve reconstructing and paving either most or all of the road, and thus the effects on traffic volumes are assumed to be similar for all three alternatives. A review of historic traffic data on similar roads indicated that traffic increases at the summit due to Alternatives 2, 4, or 5 will range between 40 and 80 percent over the No Action levels in the year 2025. This increase in traffic traveling to the summit will obviously be experienced on other portions of the road.

[1] The traffic volume projection was updated for the FEIS. New information for the analysis indicated that the reasonable annual growth rate on roads similar to Guanella Pass Road had dropped from 3.0 percent per year to 1.5 percent per year.

Alternative 3

The improvements to the roadway for Alternative 3 will increase the traffic volumes at the summit over the No Action levels by 35 percent in the year 2025.

Alternative 6

The improvements to the roadway under Alternative 6 increase traffic volumes over the future (year 2025) No Action levels by approximately 20 percent at the summit. Though Alternative 6 has more paved roadway than Alternative 3, the projected increase in traffic is less due to a significant decrease in the amount of reconstruction and reduced design standards associated with Alternative 6.

A summary of traffic volumes along Guanella Pass Road is shown in Table III-1[2]. This table shows volumes for 1995 as well as the year 2025 values for Alternative 1; the low and high-end estimate (40 and 80 percent increase over year 2025 No Action volumes at the pass, respectively) for Alternatives 2, 4, and 5; Alternative 3 (35 percent increase over the year 2025 No Action volumes at the pass); and Alternative 6 (20 percent increase over the year 2025 No Action volumes at the pass). All volumes in this table represent the weekend SADT.

Table III-1
Guanella Pass Road Weekend Seasonal Average Daily Traffic (SADT)

Count Location	1995	Alternatives - Year 2025				
		Alternative 1 (No Action) Traffic	Alternatives 2, 4, & 5 Traffic		Alternative 3 Traffic	Alternative 6 Traffic
			LOW	HIGH		
North of Grant	730	1,140	1,355	1,565	1,325	1,245
South of Guanella Pass	340	530	745	955	715	640
North of Guanella Pass	690	1,080	1,510	1,940	1,455	1,295
South of Georgetown	1,100	1,720	2,150	2,580	2,095	1,935

Source: Guanella Pass Road Traffic Study, Technical Memorandum, Traffic Volume Projections, MK Centennial, September 2001.

Increases in traffic for the count locations "North of Grant" and "South of Guanella Pass" were based on projected traffic increases over the No Action Alternative at the count location "South of Guanella Pass". Increases in traffic for the count locations "South of Georgetown" and "North of Guanella Pass" were based on projected traffic increases over the No Action

[2] The year 2025 traffic volumes for the build alternatives are calculated according to the following example for Alternative 3:

Year 2025 Alternative 3 Traffic Volume =
[2025 No Action volume at count location] + [(35%)(2025 No Action volume at North/South location at Pass)]

So, for the count location directly South of Georgetown:
2095 = [1720] + [(35%)(1080)]

Alternative at the count location "North of Guanella Pass". For a more detailed explanation as to how these projected traffic increases were estimated please refer to the *Guanella Pass Road Traffic Study, Technical Memorandum, Traffic Volume Projections* (MK Centennial, September 2002).

1c. Population and Demographics

Affected Environment

The population and demographics of a project area help determine the impact a particular project has upon the community. Table III-2 contains the past and projected populations for Georgetown, Clear Creek County, and Park County.

According to the year 2000 U.S. Census, Park County ranked fifth and Clear Creek County ranked 544th in terms of the highest percentage increase in population in the United States.

Between the years 1960 and 2000, populations of Georgetown and Clear Creek County have increased by 254 percent and 234 percent, respectively. The population of Park County has also increased rapidly, with a 697 percent increase between the years 1960 and 2000.

Population forecasts by the Colorado Division of Local Government show a 23 percent increase in the population of Clear Creek County between the years 2000 and 2010, and a projected 32 percent increase between the years 2010 to 2020. Corresponding figures for Park County show a 155 percent increase from the years 2000 to 2010, and a 127 percent increase from the years 2010 to 2020. These are higher than the corresponding figures for the entire state of Colorado, which are 20 percent for the years 2000 to 2010, and 17 percent for the years 2010 to 2020.

Demographics reveal that the region around Guanella Pass Road is predominantly Caucasian and English speaking. People with ethnicity other than Caucasian make up approximately six percent of the total population. Persons with a mobility or self-care limitation make up less than one percent of the population. The median age in Georgetown is 38.9 years, with 15.3 percent of the population below the age of 15 and 8.2 percent of the population above the age of 65. Of the adult population, 95.4 percent have a high school diploma and 25.4 percent hold a bachelor's degree or higher. In 1989, the median household income was $25,484.

Environmental Consequences

Because Guanella Pass Road extends through primarily federally owned and managed lands, improving Guanella Pass Road is not expected to increase the population of Georgetown, Clear Creek County, or Park County above the current projections. **Chapter III.B.1e: Land Use** details the land ownership and use along the project corridor. None of the alternatives have an impact that is more severe or less severe (as compared to impacts on the community as a whole) on the elderly, any specific ethnic group, people living under the poverty level, or persons with a mobility or self-care limitation.

Table III-2
Population – Past and Projected

Year	Georgetown		Clear Creek County		Park County		Statewide
Past Population	**Pop.**	**% Change**	**Pop.**	**% Change**	**Pop.**	**% Change**	**% Change**
1960	307	N/A	2,793	-15%	1,822	-3%	32%
1970	542	77 %	4,819	73 %	2,185	20%	26%
1980	830	53 %	7,308	52 %	5,333	144%	31 %
1990	891	7 %	7,619	4 %	7,174	35 %	14 %
1995	944 (1994)	12%	8,313	9%	9,558	33%	16%
2000	1,088	15%	9,322	12%	14,523	52%	13%
Projected Population							
2005	N/A	N/A	10,272	10%	23,629	63%	10%
2010	N/A	N/A	11,482	12%	37,004	57%	9%
2015	N/A	N/A	13,162	15%	56,470	53%	9%
2020	N/A	N/A	15,098	15%	83,873	49%	8%

Source for Projected Population: Department of Local Affairs, Division of Local Government.
N/A: Not Available
Note: Data in table has been updated since the DEIS to reflect the year 2000 census information.

1d. Local Economy

Affected Environment

Since the decline of the mining industry, many residents of Park County and Clear Creek County commute outside the county for employment. This is illustrated by comparing the size of the labor force with the number of jobs. In 1993, Clear Creek County had 0.52 jobs for every person in the labor force. The job shortage was more pronounced in Park County which had only 0.24 jobs for every person in the labor force.

In Park County, the primary employment opportunities are in government (49.4 percent), retail trade (17.2 percent), and services (14 percent). In Clear Creek County, the employment base is comprised of retail trade (27 percent), government (23 percent), mining (20 percent), and services (18.5 percent). Table III-3 shows the distribution of employment for Park County and Clear Creek County.

Park County and Clear Creek County remain well below the state in gross sales activity per capita. Table III-4 shows the gross sales per capita for Park County, Clear Creek County, and the State of Colorado. Gross sales per capita is gross sales divided by total population. This value measures the volume of sales activity relative to the number of residents; it is one indicator of the depth of business activity in a community. Comparing percentage growth of sales activity per capita from 1980 to 2000, Clear Creek County experienced a 166 percent growth, whereas the state grew by 119 percent, and Park County grew by 76 percent.

Table III-3
Employment by Type of Work for Park and Clear Creek Counties - 1993

Type of Employment	Park County		Clear Creek County	
	Number	Percent of Total	Number	Percent of Total
Retail Trade	200	17.2 %	693	27 %
Government	573	49.4 %	588	23 %
Mining	N/A	N/A	485	20 %
Services	164	14 %	470	18.5 %
Transportation, Communication, and Utilities	19	1.6 %	76	3 %
Wholesale Trade	10	1%	60	2.4 %
Finance, Insurance, and Real Estate	20	1.7 %	40	1.6 %
Construction	107	9.2 %	21	1 %
Manufacturing	40	3.4 %	62	2.4 %
Total Employment	1,161	100 %	2,535	100 %
Source: Colorado Department of Labor and Employment *N/A: Data is not available because of disclosure laws.*				

Table III-4
Gross Sales per Capita

Location	2000	1990	1980
Park County	$5,655	$4,455	$3,217
Clear Creek County	$16,163	$9,569	$6,085
State of Colorado	$29,662	$19,009	$13,558
Source: Colorado Department of Revenue			

Georgetown is the county seat of Clear Creek County. The resident population of Georgetown was 1,088 in 2000 (12 percent of Clear Creek County's population). The five largest employers are Clear Creek County Government, Georgetown Loop Railroad, Swiss Inn Restaurant, Super 8 Motel, and the Town of Georgetown.

The community of Grant, population 15, is in unincorporated Park County. The business district is located on U.S. Highway 285 and consists of two taverns, a restaurant, and a general store.

The community of Bailey is located 18 kilometers (11 miles) east of Grant on U.S. Highway 285. Several general stores, service stations, gift shops, restaurants, a lumber yard, health center, two printers, two newspapers, and a county service center with a library are located in Bailey.

Environmental Consequences

Several potential enhancements to the economies of Georgetown, Grant, and Bailey could occur if Guanella Pass Road is improved. Additional visitors to area communities create increased taxable retail sales, increased employment, expanded recreational services, and more year-round visitor activity. Additional visitors also present potential problems to local economies in the form of increased traffic congestion and use of limited parking areas. These factors may discourage the use of local businesses.

Effects to the local economy are focused around the expected increase in traffic in the area. Impacts from additional traffic include both visitors that pass through the communities and those that stop.

Table III-5 shows the estimated ADT volumes traveling through Georgetown and Grant for Alternatives 1-6. The economic analysis assumes the traffic volume increases over no action at the pass to be 80 percent for Alternatives 2, 4, and 5 (the 40 percent increase is omitted for brevity); 35 percent for Alternative 3; and 20 percent for Alternative 6.

Traffic projections during the aspen viewing season are included in the analysis to show the large increase in visitor traffic during the peak season. The traffic increase estimates listed in Table III-5 are based on percent increases over existing volumes. The existing volumes were determined through the use of automatic traffic counters placed along Guanella Pass Road during 1994 and 1995.

Table III-5
Estimated ADT Volumes
Traveling Through Communities As a Result of Guanella Pass Road -Year 2025

	2025 No Action ADT	Alternatives 2, 4, & 5 (High Estimate)	Alternative 3	Alternative 6
Grant/Bailey				
Summer Season				
Weekday	461	605	524	497
Weekend	1,141	1,566	1,327	1,247
Winter Season				
Weekday	133	189	157	147
Weekend	305	461	373	344
*Aspen Viewing Season**				
Weekday	696	1,033	843	780
Weekend	3,532	5,714	4,487	4,078
Georgetown				
Summer Season				
Weekday	680	968	806	752
Weekend	1,719	2,582	2,097	1,935
Winter Season				
Weekday	211	249	227	220
Weekend	445	583	506	480
*Aspen Viewing Season**				
Weekday	1,305	1,536	1,406	1,363
Weekend	6,127	7,196	6,595	6,394

Sources: Guanella Pass Road Colorado Forest Highway 80 Economic Impacts Technical Memorandum, March 1997; Addendum to Guanella Pass Road Colorado Forest Highway 80 Economic Impacts, September 2002; and Guanella Pass Year 2025 Traffic Projections Technical Report.

** The forecast year 2025 aspen viewing season traffic projections shown here were estimated using methodology established for forecasting volumes for the rest of the year. However, traffic patterns during aspen viewing season are not typical of patterns during the rest of the year so estimates may be less accurate.*

Traffic volumes shown in Table III-5 are converted into traffic stopping in the communities based on a 1994 survey of drivers on Guanella Pass Road. Results of the survey indicate that in the year 2025, 47 percent of all traffic would stop in Georgetown, nine percent would stop in Grant, and five percent would stop in Bailey. Applying these percentages to the traffic projections from Table III-5 results in the values for visitor traffic stopping in each community shown in Table III-6.

Table III-6
Estimated Number of Vehicles Per Day
Stopping in Communities As a Result of Guanella Pass Road, Year 2025

	2025 No Action	Alternatives 2, 4, & 5 (High Estimate)	Alternative 3	Alternative 6
Grant				
Summer Season				
Weekday	41	54	47	45
Weekend	103	141	119	112
Winter Season				
Weekday	12	17	14	13
Weekend	27	41	34	31
*Aspen Viewing Season**				
Weekday	63	93	76	70
Weekend	318	514	404	367
Bailey				
Summer Season				
Weekday	23	30	26	25
Weekend	57	78	66	62
Winter Season				
Weekday	7	9	8	7
Weekend	15	23	19	17
*Aspen Viewing Season**				
Weekday	35	52	42	39
Weekend	177	286	224	204
Georgetown				
Summer Season				
Weekday	320	455	379	353
Weekend	808	1,214	986	909
Winter Season				
Weekday	99	117	107	103
Weekend	209	274	238	226
*Aspen Viewing Season**				
Weekday	613	722	661	641
Weekend	2,880	3,382	3,100	3,005

Sources: Guanella Pass Road Colorado Forest Highway 80 Economic Impacts Technical Memorandum, March 1997 and Addendum to Guanella Pass Road Colorado Forest Highway 80 Economic Impacts, September 2002.

** The forecast year 2025 aspen viewing season traffic projections shown here were estimated using methodology established for forecasting volumes for the rest of the year. However, traffic patterns during aspen viewing season are not typical of patterns during the rest of the year so estimates may be less accurate.*

Increased visitor traffic raises the potential to capture additional retail dollars. Based on average vehicle occupancy (2.7 persons[3]) and the average amount a person spends on retail purchases ($15.77), the daily retail expenditure per vehicle is $42.58. Multiplying $42.58 in daily retail expenditures per vehicle by the number of cars stopping in Georgetown, Grant, and Bailey (from Table III-6) provides a forecast of the daily taxable retail sales for each local economy, as shown in Table III-7. Increased sales activity creates opportunities for new retail shops, restaurants, gas stations, and lodging establishments to develop new jobs.

Deterrents to the growth of the economies of Georgetown, Grant, and Bailey could also occur if Guanella Pass Road is improved. These deterrents could include traffic congestion and limited parking in the communities or on Guanella Pass that discourage vehicles from stopping and supporting local businesses.

Table III-6 (shown previously) presents forecast increases in vehicles stopping in Georgetown, Grant, and Bailey. These increases may create seasonal parking problems during the high-visitor months of June through September. According to local officials in Georgetown, currently the downtown business district provides sufficient parking, with approximately one space per 28 square meters (300 square feet) of commercial activity. Overflow parking is required three times during the year: 4th of July, aspen viewing season, and Christmas Market. During these special events, buses are used to transport visitors to and from off-site parking locations.

The Georgetown Planning Commission is concerned with current traffic flow problems at certain locations within the downtown area. Their position is that, if Guanella Pass Road is improved and paved, a bypass route would be required to divert through traffic around downtown Georgetown. Numerous bypass routes were evaluated during the course of the project, and none were considered desirable by the local community. As a result, they were dropped from further consideration (see **Chapter II.F.9: Realignment Options Considered and Eliminated**).

The project could also impact business at the dude ranch located along Guanella Pass Road. A survey of 14 members of the Colorado Association of Dude and Guest Ranches was completed to help assess the potential impact that improvements to Guanella Pass Road will have on the dude ranch located along the road. Half of the ranches surveyed are located on paved roads and half on unpaved roads. The survey revealed the following:

- No difference exists between the occupancy rates of those guest ranches located on paved roads and those on unpaved roads.
- An equal number of ranches located on paved and unpaved roads use the public rights-of-way for ranch activities.
- Of the ranches located on paved roads, 86 percent stated that the current road conditions were a positive aspect of their business.
- Of those ranches located on unpaved roads, 29 percent said that the current road conditions are a positive aspect of their business because the road is well maintained, 29 percent said it

[3] Based on the 1993 Longwood Travel USA Study, the average vehicle occupancy for Denver is 2.7 persons. The average visitor spends $50.88 (1995 dollars) per day with 31 percent in retail purchases.

was a negative aspect of their business because the road is dangerous and not well maintained, and 42 percent said the current road conditions do not impact their business.

- Three of the ranches surveyed were experiencing construction on the road to their ranch at the time of the survey. None of the three had experienced any negative impacts, mainly due to the fact that the guests make their reservations well in advance.

Table III-7
Estimated Daily Taxable Retail Sales for Each Community as a Result of Guanella Pass Road, Year 2025*

	Year 2025 No Action $	Alternatives 2, 4, & 5 (High Estimate) $	Alternative 3 $	Alternative 6 $
Grant				
Summer Season				
Weekday	1,767	2,318	2,008	1,905
Weekend	4,373	6,001	5,085	4,779
Winter Season				
Weekday	510	724	602	563
Weekend	1,169	1,767	1,429	1,318
Aspen Viewing Season				
Weekday	2,665	3,959	3,231	2,989
Weekend	13,537	21,898	17,195	15,627
Bailey				
Summer Season				
Weekday	981	1,288	1,116	1,058
Weekend	2,429	3,334	2,825	2,655
Winter Season				
Weekday	283	402	334	313
Weekend	649	981	794	732
Aspen Viewing Season				
Weekday	1,481	2,200	1,795	1,660
Weekend	7,520	12,166	9,553	8,682
Georgetown				
Summer Season				
Weekday	13,609	19,372	16,130	15,049
Weekend	34,402	51,673	41,966	38,724
Winter Season				
Weekday	4,223	4,983	4,543	4,403
Weekend	8,906	11,667	10,126	9,606
Aspen Viewing Season				
Weekday	26,119	30,748	28,144	27,276
Weekend	122,616	144,012	131,977	127,965

Sources: Guanella Pass Road Colorado Forest Highway 80 Economic Impacts Technical Memorandum, March 1997 and Addendum to Guanella Pass Road Colorado Forest Highway 80 Economic Impacts, September 2002.

**Estimates given in year 1995 dollars.*

Based on the results of this survey, it cannot be conclusively stated that the proposed Guanella Pass Road improvements, including the construction activities, would or would not adversely impact dude ranch business.

A more detailed analysis of this topic is provided in the *Addendum to Guanella Pass Road/Colorado Forest Highway 80 Economic Impacts* (MK Centennial, September 2002).

1e. Land Use

Affected Environment

The Guanella Pass Road project corridor consists of three major land use areas. These areas include the communities of Georgetown and Grant, and the NF lands along the road. Georgetown is a unique community composed of a variety of land uses and building types. Some of the buildings are more than 130 years old. The southwest portion of Georgetown is the oldest portion of the community and includes a well-defined commercial area. Public land uses include the Georgetown Town Hall, the Clear Creek County offices, the Tomay Memorial Library, the Georgetown Community Center, the Georgetown Elementary School, the post office, and the fire department. The old residential district extends south from approximately 11th Street and continues up through the first switchback of Guanella Pass Road. A map of Georgetown is presented in Figure III-3.

North of 11th Street is generally residential in the east portion of town, and commercial along Argentine Street. A small concentration of commercial development exists at the Interstate 70 interchange including gas stations, a hotel, and a convenience store. North of 15th Street are newer developments, including a number of duplexes and multifamily units as well as single family housing.

The Historic District Public Lands Commission is an organization composed of Georgetown and Silver Plume, Historic Georgetown, Inc., the Colorado Historical Society, the CDOW, and Clear Creek County. This organization represents much of the land ownership along Guanella Pass Road between Georgetown and the Arapaho NF.

Grant is located at the south end of the study area. It is a small community located at the intersection of Guanella Pass Road and U.S. Highway 285. Grant is composed of a few homes and businesses. A post office and the Platte Canyon Volunteer Fire Department Station #3 are also in Grant.

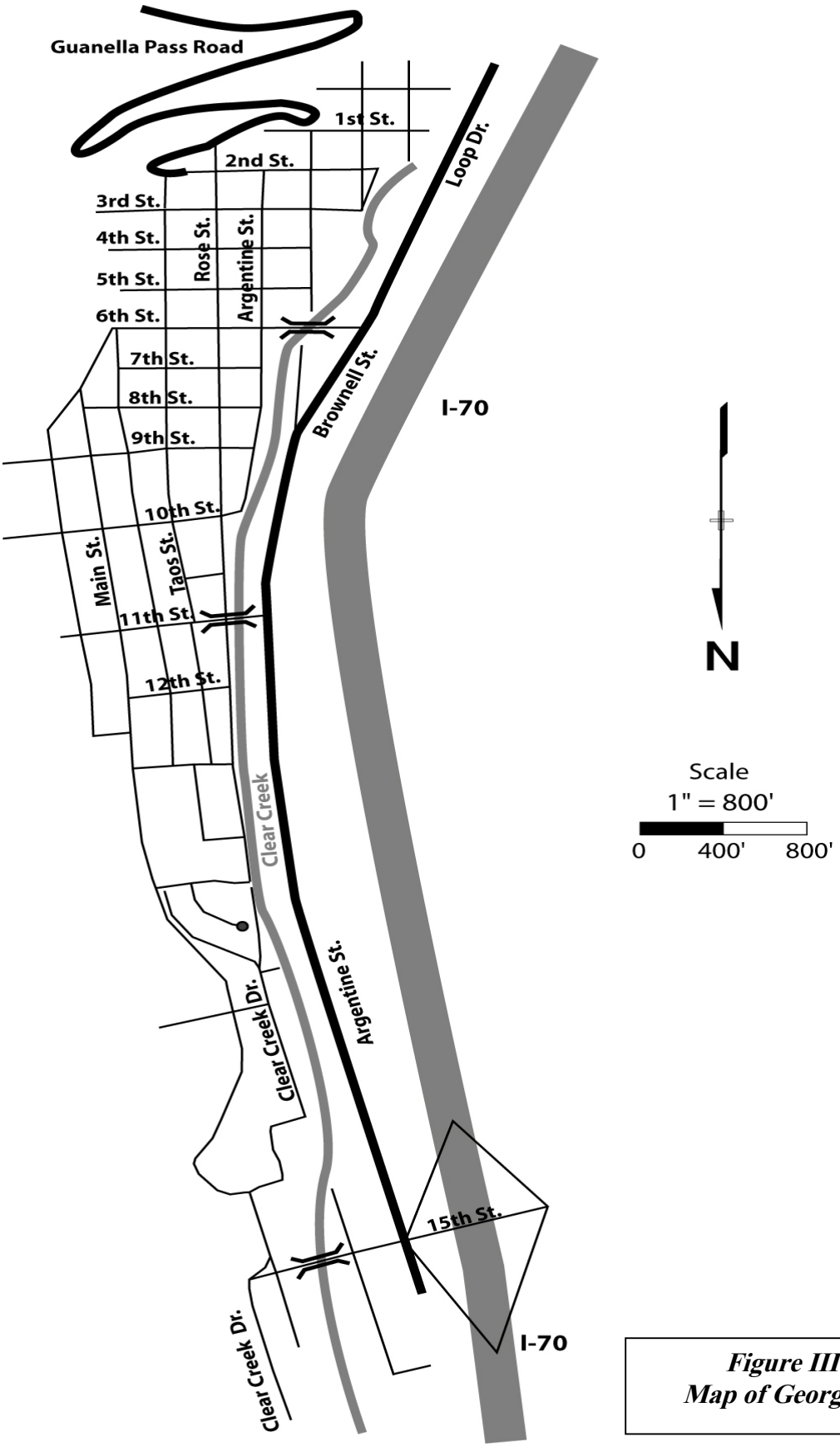


Figure III-3
Map of Georgetown

The land along Guanella Pass Road is predominantly open, undeveloped forest land. Much of the land along the road is in NFs. The Arapaho NF extends from 4.5 kilometers (2.7 miles) south of Georgetown to Guanella Pass, and the Pike NF extends from Guanella Pass to near Grant.

Private development along Guanella Pass Road includes some single-family residential homes (most near Grant and Georgetown) and some ranches, many of which are used seasonally and some of which are used year-round. A large dude ranch is located on the south end of the road approximately 9.6 kilometers (6 miles) north of Grant.

Xcel Energy operates a hydroelectric plant on the north side of the pass approximately 6.4 kilometers (4 miles) south of Georgetown. The Georgetown Reservoir, which provides the drinking water supply for the town, is also on the north side of the pass between the Xcel Energy facility and Georgetown.

Figure III-4 delineates the ownership status of the land adjacent to Guanella Pass Road.

Environmental Consequences

In general, the build alternatives will cause temporary construction impacts to land use in the area. These are discussed in **Chapter III.B.6: Construction Impacts**. Long-term impacts on Georgetown and along Guanella Pass Road include an increase in traffic levels for all alternatives (including no action). Increased traffic, tourism, and demand for services may increase pressure for development of privately held land into recreational or other uses, but that pressure is not expected to increase dramatically because there is not a great deal of private land in the project corridor. The private holdings are generally near Georgetown and the Georgetown Reservoir. A large portion of the private land is held by Historic Georgetown or the Historic District Public Lands Commission for the purpose of protecting the land. The local government can also control development through zoning regulations.

Alternative 1

Traffic levels, and their effect on the land use activities in the corridor, will be lower for Alternative 1 than for any other alternative.

Alternatives 2, 4, 5

Alternatives 2, 4, and 5 are predicted to cause the greatest increase in long-term traffic levels, and thus they will likely have the greatest impact on local land use.

Alternative 3

Alternative 3 is expected to cause an intermediate increase in traffic levels. It would likely have a greater impact on land use than Alternatives 1 or 6, but less of an impact than alternatives 2, 4, or 5.

Alternative 6

Under Alternative 6, Clear Creek County, Park County, the Town of Georgetown, and the FS will manage the road corridor as a rural local road. As stipulated in the management responsibilities for Alternative 6 (**Chapter II.D.6: Management Responsibilities**), the local agencies are responsible for managing the road for local use, managing restrictions affecting

oversize and commercial vehicles, and not encouraging an increase in through traffic. The land use and future local plans for the corridor need to remain consistent with the road's designation as a rural local road if the road is to safely function. Future development, either commercial or residential, is assumed to be regulated by the local agencies to reflect a rural local road functional classification. Alternative 6 is predicted to cause the least amount of long-term increased traffic levels of all the build alternatives.

More detailed information regarding the land use along the Guanella Pass Road corridor is in the *Guanella Pass Road Colorado Forest Highway 80 Land Use Technical Memorandum* (MK Centennial and Hermsen Consultants, March 1997).

1f. Consistency with Local Plans

Affected Environment

Five government agency plans apply to the Guanella Pass Road project corridor. They include:

- *USDA Forest Service 1997 Revision of the Land and Resource Management Plan, Arapaho and Roosevelt National Forests and Pawnee National Grassland*
- *USDA Forest Service 1984 Land and Resource Management Plan, Pike and San Isabel National Forests; Comanche and Cimarron National Grasslands*.
- *Clear Creek County Comprehensive Plan*
- *Park County Comprehensive Plan*
- *Town of Georgetown Comprehensive Plan*

USDA Forest Service 1997 Revision of the Land and Resource Management Plan, Arapaho and Roosevelt National Forests and Pawnee National Grassland

Management emphasis goals and objectives of the Arapaho and Roosevelt National Forests and Pawnee National Grassland pertinent to this project include:

- Manage the forests and grassland to assure productive, healthy ecosystems, blending social, physical, economic, and biological needs and values.
- Protect the basic air, soil and water resources.
- Bring all 6th level watersheds to functional condition. (The project area falls within two 6th level watersheds: the entire South Fork of Clear Creek and the lower portion of Clear Creek. Both of these watersheds are currently rated as "at risk" watersheds.)

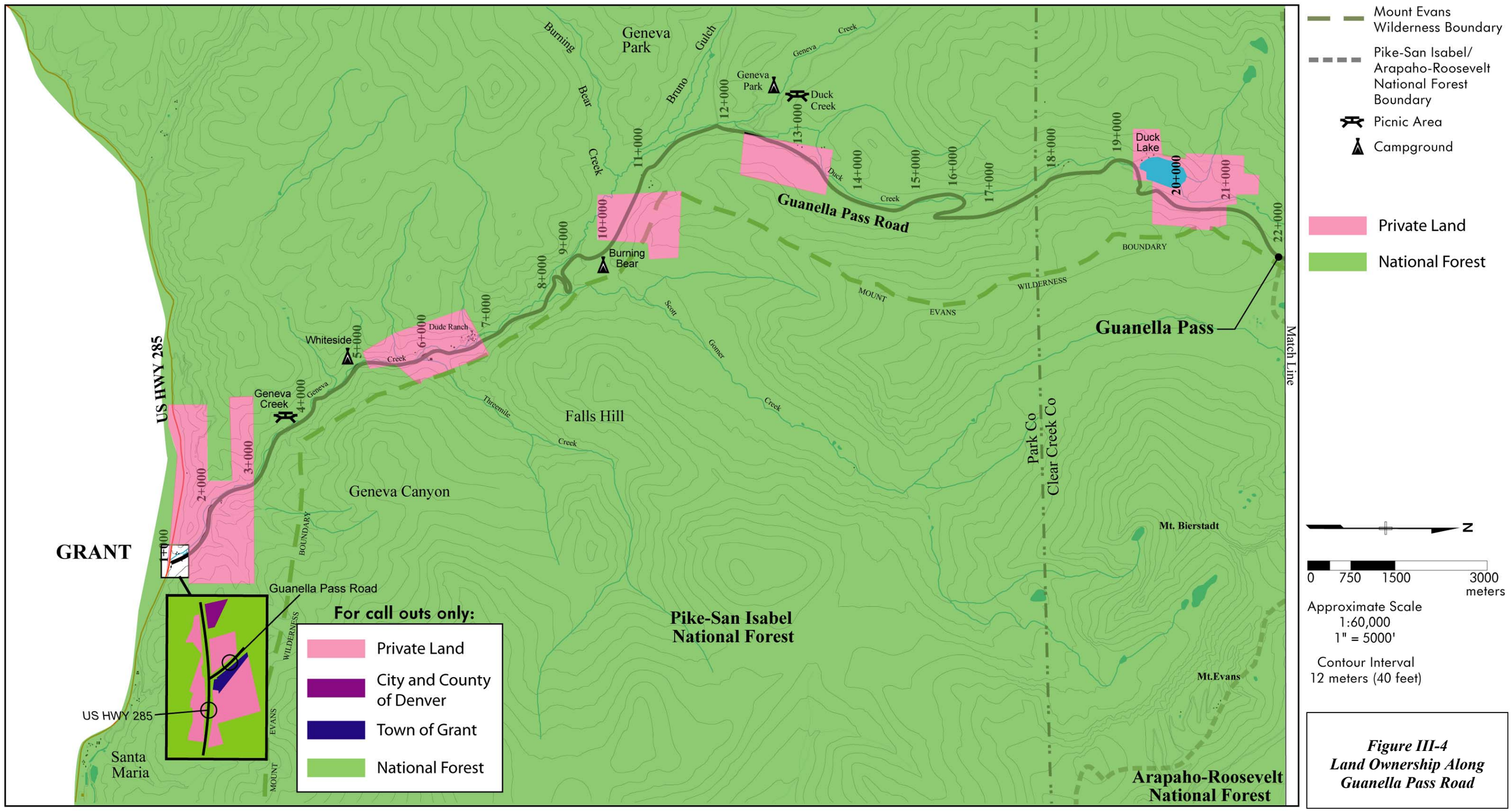


Figure III-4
Land Ownership Along
Guanella Pass Road

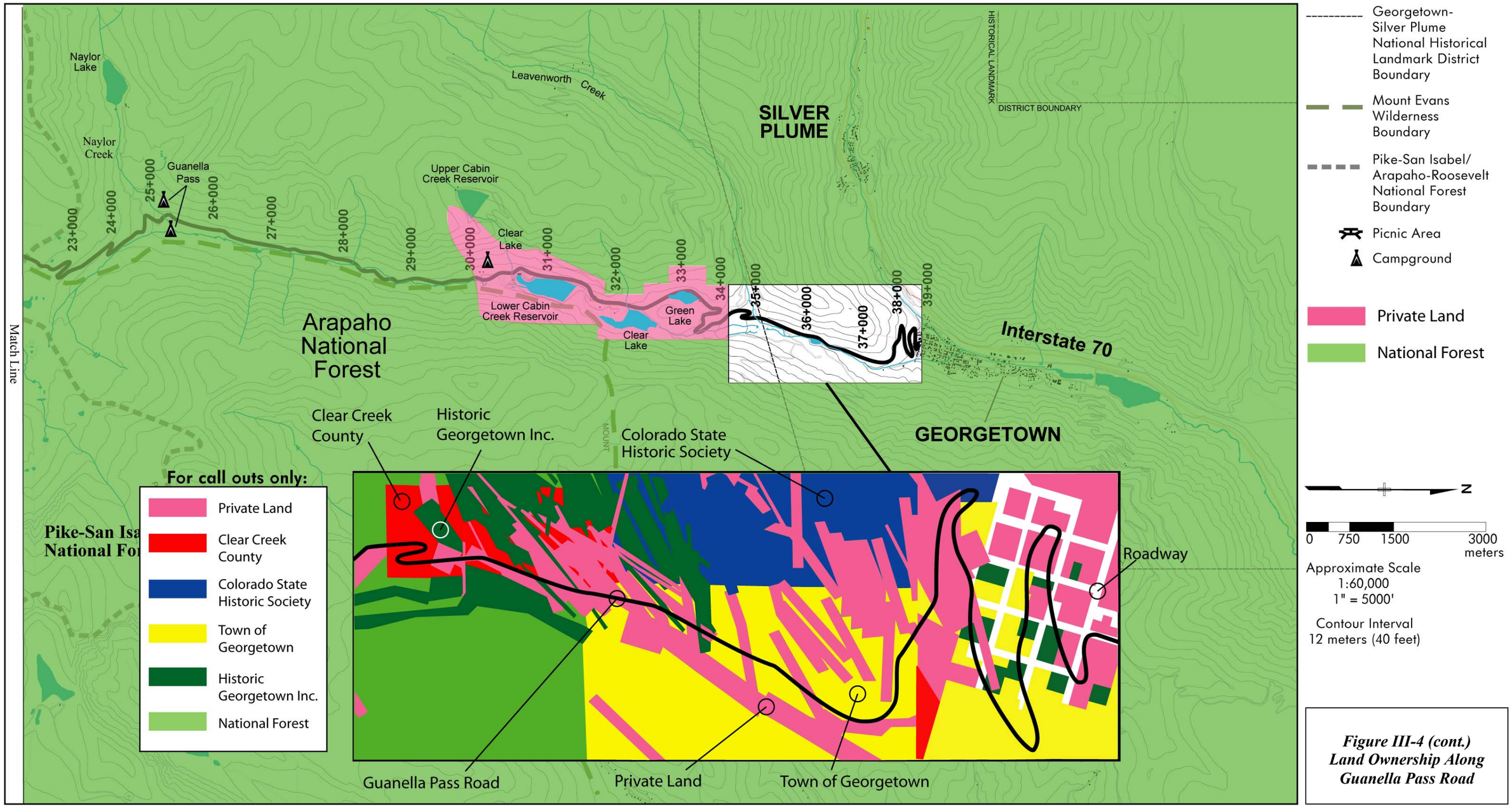


Figure III-4 (cont.)
Land Ownership Along
Guanella Pass Road

- Maintain or improve water quality, stream processes, channel stability and aquatic management indicator species habitat, and riparian resources, while providing for municipal and agricultural uses.

- Provide quality developed, dispersed, and wilderness recreational opportunities within the resource capacity of the area.

- Provide an integrated travel system that considers various modes of motorized and nonmotorized use consistent with the resource capacity of the area.

The Guanella Pass corridor is located in the Loveland Pass Geographic Area and is within management prescription area 4.2 Scenery Management. Two key goals for this area are: (1) provide a variety of recreational opportunities while maintaining important habitat for boreal toad, wolverine, bighorn sheep, and mountain goat. Add and improve trailhead and nonmotorized trails at key attraction areas such as the Continental Divide, high peaks, and alpine lakes; and, (2) seek opportunities to improve conditions in the Clear Creek and South Clear Creek watersheds, which were rated as non-functional in the watershed condition assessment. Specific direction to the Guanella Pass Scenic Byway emphasizes improving trailheads, designating and improving dispersed sites, providing interpretive sites, and protecting riparian areas.

USDA Forest Service 1984 Land and Resource Management Plan, Pike and San Isabel National Forests, Comanche and Cimarron National Grasslands

The general Forest Direction Goals for the Pike and San Isabel NFs; Comanche and Cimarron National Grasslands applicable to this project include:

- Management of the transportation system for increased cost-effectiveness, efficiency, and utility.

- Design and implement activities to protect and manage the riparian ecosystem.

- Improve or maintain water quality to meet State and Federal water quality standards.

- Maintain air quality compatible with Sate and Federal laws.

- Rehabilitate disturbed areas that are contributing sediment directly to perennial streams as a result of management activities to maintain water quality and re-establish vegetation cover.

- Maintain soil productivity, minimize man-caused soil erosion, and maintain the integrity of associated ecosystems.

- Provide adequate road and trail cross-drainage to reduce sediment transport energy.

- Revegetate all areas, capable of supporting vegetation, disturbed during road construction and/or reconstruction to stabilize the area and reduce soil erosion. Use less palatable plant species on cuts, fills, and other areas subject to trampling damage by domestic livestock and big game to discourage grazing by herbivores.

The Guanella Pass Road corridor passes through three management prescription areas within the Pike NF, 2B-Rural and Roaded Natural, 8B–Primitive Wilderness, and 8C-Semi primitive Wilderness. The key goals for these prescriptive areas include: (1) emphasis on recreation opportunities consistent with the management area; (2) Locate and design required access roads to minimize the biophysical and visual impact, and to facilitate restoration; and, (3) design and implement management activities to provide a visually appealing landscape, and enhance or provide more viewing opportunities.

Other Local Comprehensive Plans

The *Clear Creek County Comprehensive Plan* seeks to "maximize county utilization of existing transportation infrastructure and to assure that future development recognizes county transportation needs and conforms to the overall vision for county growth". One of the plan's visions for transportation is an improvement of north/south linkages within the county. The plan includes a "Desired Future" section that restates a desire for improved north/south linkages as well as for a balance between transportation needs and environmental and historical concerns.

In the *Park County Comprehensive Plan*, economic development policy encourages the county to seek to optimize investments by other public sector institutions. The comprehensive plan states that the county should seek to work with state and federal agencies that could spend money to maintain and upgrade facilities in the county. Guanella Pass Road is such a facility. The *Park County Comprehensive Plan* also states that the county will work with state and federal agencies to seek supplemental funding to upgrade and maintain collector/connector and local roads that link major recreational assets to major highways. This applies directly to Guanella Pass Road, which is a rural local road providing access from two major highways (Interstate 70 and U.S. Highway 285) to recreational areas along the road.

The *Town of Georgetown Comprehensive Plan* outlines several concerns regarding Guanella Pass Road. The issues include the potential for a large increase in traffic, a decrease in the rural and scenic quality of the road, the visual impact of the road reconstruction on Leavenworth Mountain just west of the road corridor near Georgetown, the impact of construction on the quality of life and business revenue in Georgetown, and the affect of the construction vehicles on the Georgetown infrastructure. The *Town of Georgetown Comprehensive Plan* also states that Clear Creek County is having trouble maintaining Guanella Pass Road due to increased traffic, steep grades, drainage problems, and County budget constraints. The Town of Georgetown wants to promote a local and regional road network that serves the needs of residents and visitors, minimizes the disruption to residential areas by vehicular traffic, maintains the highest possible safety standards, and protects the historical integrity of Georgetown.

In addition to the above agency plans, the *Guanella Pass Scenic and Historic Byway Corridor Management Strategy* (CMS) was released in November of 2001. The CMS is a planning tool that provides a specific vision for the future management of the corridor and gives detailed descriptions for management of the corridor's natural, scenic, recreation, historic, cultural, and archaeological resources. The CMS is not a decision document. Therefore, an analysis of the consistency of each alternative with the CMS will not be made within this FEIS.

The CMS was collaboratively developed by the FS and a diverse group of stakeholders who together made up the Scenic Byway Committee (SBC). Several open houses and SBC meetings were held to aid in the development of the CMS. The SBC consisted of individuals representing the following organizations:

- Clear Creek County Commissioners
- Clear Creek County Tourism Board
- Clear Creek County Open Space Commission
- Clear Creek County Economic Development Corporation
- Town of Empire
- Town of Georgetown
- Colorado Mountain Club
- Scenic Colorado
- Tumbling River Ranch

One consideration in the formulation of management strategies is the increase in traffic volumes associated with all of the alternatives. The strategies serve to answer the best way to address increasing use of the corridor, such as limiting the number of visitors using the area or designing facilities to accommodate increasing demand.

Environmental Consequences

USDA Forest Service 1997 Revision of the Land and Resource Management Plan, Arapaho and Roosevelt National Forests and Pawnee National Grassland

Alternative 1

Alternative 1 is not consistent with the goals or objectives of this plan. No improvements to the sedimentation or erosion problems of the road corridor will be addressed. Though traffic and the associated exhaust levels will not increase as much as for the build alternatives, dust will remain a problem for the air quality of the corridor.

Alternatives 2-6

Each build alternative in this project was designed with consideration of the goals and objectives of this plan and is consistent with them. The full reconstruction of the entire road in Alternatives 2 and 3 provides the greatest amount of slope stability of all alternatives, while the increase in hardened surface proposed for Alternatives 2, 4, 5, and 6 all will reduce dust and sedimentation. This helps to protect the basic air, soil, and water resources.

USDA Forest Service 1984 Land and Resource Management Plan, Pike and San Isabel National Forests, Comanche and Cimarron National Grasslands

Alternative 1

Alternative 1 is not consistent with the goals or objectives of this plan. No improvements to the sedimentation, dust, or erosion problems of the road corridor will be addressed. Disturbed areas are not rehabilitated or revegetated.

Alternatives 2-6

The proposed Guanella Pass Road improvements were designed to be consistent with both the general forest direction and the specific applicable management prescriptions as contained in the *Land and Resource Management Plan, Pike and San Isabel National Forests; Comanche and Cimarron National Grasslands*.

The full reconstruction of the entire road in Alternatives 2 and 3 provides the greatest amount of slope stability of all alternatives, while the increase in hardened surface proposed for

Alternatives 2, 4, 5, and 6 all will reduce dust and sedimentation. All build alternatives include rehabilitating and revegetating previously disturbed areas.

Other Local Comprehensive Plans

Alternative 1

Alternative 1 does not improve north/south linkages in Clear Creek County, and therefore is not consistent with this recommendation of the *Clear Creek County Comprehensive Plan*.

Alternative 1 does not address the *Park County Comprehensive Plan's* economic development policy encouraging the use of Federal funds to improve county facilities and upgrade local roads that provide access to recreational facilities, such as Guanella Pass Road.

Though it does address a majority of the *Town of Georgetown Comprehensive Plan*'s scenic and construction impact concerns, Alternative 1 does not complement the comprehensive plan's future vision of an efficient transportation network. The safety and structural deficiencies of Guanella Pass Road remain unchanged, and the county will still have difficulties maintaining the road in its current state as traffic volumes increase.

Alternatives 2-6

Alternatives 2-6 are in accord with recommendations in the *Clear Creek County Comprehensive Plan* that call for improving north/south linkages in the county. Of all alternatives, Alternative 6 is the most consistent with the county's desire to balance transportation needs with environmental and historical concerns.

Alternatives 2-6 all propose Federally-funded improvements to Guanella Pass Road. This is consistent with the economic development policy of the *Park County Comprehensive Plan* which encourages using state and Federal funds to upgrade facilities and local roads providing access to recreational areas.

Alternatives 2, 3, 4, and 5 are not entirely consistent with the *Town of Georgetown Comprehensive Plan* because of the amount of full reconstruction proposed by these alternatives. These alternatives encourage more traffic than Alternatives 1 and 6 and will likely have more of an impact on Leavenworth Mountain as well as on the traffic, economy, and quality of life of Georgetown. However, Alternatives 2-5 will provide more sedimentation, erosion, and drainage control than Alternatives 1 and 6. Alternatives 2-5 also address the need to promote an efficient transportation network in the area.

Alternative 6 is complementary to the comprehensive plan with respect to preserving and promoting an efficient transportation network. Alternative 6 limits the amount of full reconstruction and paving, which should reduce estimated traffic levels and reduce impacts to Leavenworth Mountain as compared to the other build alternatives. Alternative 6 also improves the drainage problems that have plagued the corridor.

1g. Cultural Resources

Cultural resources are physical remains of historical or archaeological significance. A cultural resource study was conducted along Guanella Pass Road. This study was done in compliance

with the National Historic Preservation Act of 1966, as amended, the Archaeological and Historic Preservation Act of 1974, the Archaeological Protection Act of 1979, and the Native American Graves Protection and Repatriation Act of 1990 (NAGPRA).

The cultural resources investigation consisted of background research and a pedestrian field survey. Background research, including archival research, a literature review, a records search for previously recorded sites, and consultation with local Georgetown officials, covered an extended 3.2 kilometer (2.0 mile) wide study corridor. The field survey conducted in 1995 and 1996 covered a study corridor 60 meters (200 feet) wide along the existing route (30 meters [100 feet] on each side of existing roadway). Additional fieldwork was conducted in November 1998 to record and evaluate historic properties on private lands where access was denied in 1995 and 1996. In 2000 and 2001 additional fieldwork was also conducted to survey three borrow/material source sites, a temporary construction traffic bypass bridge site, and three parking areas.

Affected Environment

A file search of all available archaeological records at the Colorado Historical Society made it evident that very little of the region has been previously inventoried. Five multi-site cultural resource inventories had previously taken place within or in the proximity of the Guanella Pass Road study corridor. Nine new archeological sites and six isolated occurrences (IOs) were discovered and recorded as a result of the recent inventories. IOs generally exhibit lower levels of human activity and have a lower potential than archeological sites in providing substantial information. In addition, ten previously recorded sites within or adjacent to the study corridor were revisited and reevaluated. Following is a brief description of the cultural resources identified within or adjacent to the proposed project construction limits:

Georgetown-Silver Plume National Historic Landmark District (Site # 5CC3)

This 1,331 hectare (3,288 acre) historic district includes the towns of Georgetown and Silver Plume, as well as the valley between the two communities (Figure I-2). The communities in the district grew and flourished first as a mining region and later as a recreational center for the people of the Denver metropolitan area. In 1858 the discovery of gold along the South Platte River quickly led to prospecting along Clear Creek and the gold rush of 1859. That same year, the brothers George and David Griffith staked a claim at the future site of Georgetown. The Griffith lode led to the founding of 'George's Town'. After only a small amount of gold was found, the mining focus shifted to silver. At its zenith from 1867 to 1876, Georgetown was dubbed the "Silver Queen of the Rockies". The population grew to 5,000 by 1876, but prosperity was fleeting and Georgetown's days as "Silver Queen" came to an end with the repeal of the Sherman Silver Purchase Act of 1893. Mines were closed and Georgetown's population shrank to a low of 300 in 1930. The GSPNHLD was the subject of a historic sites reconnaissance survey in 1980. As a result, 211 buildings recorded within the GSPNHLD are contributing properties to the historic mining era significance of Georgetown and the District as a whole.

Guanella Pass Road begins in the historic district at Rose Street in Georgetown, extends southward along Leavenworth Mountain through a series of four switchbacks, and exits the district at the Georgetown Reservoir. The length of the road within the district is 3.0 kilometers

(1.9 miles). Existing cuts associated with the road are visible from many vantage points throughout the district.

Colorado Central Railroad Grade (Site # 5CC3.1/5CC9)

With the mining boom of the 1870's, the Colorado Central Railway constructed a narrow gauge railroad up Clear Creek Canyon to Georgetown in 1877. A portion of the Colorado Central Railroad Grade intersects Guanella Pass Road at the second switchback just above and to the south of Georgetown. It has been used as a driveway to a private residence in the recent past. This small portion of the grade is within the Guanella Pass Road study corridor and was originally part of the narrow-gauge rail-bed linking Georgetown to Silver Plume. Only a portion of the grade along the lower slopes of Clear Creek Canyon at the east edge of Georgetown between Third and Sixth Streets retains integrity of setting, design, and materials. The railroad, including the segment in the study corridor, has been determined eligible for listing on the NRHP as a contributing property to the GSPNHLD.

Georgetown Forebay Dam and Reservoir (Site # 5CC461.3) and Clear Lake Dam and Reservoir (Site # 5CC461.4)

Both the Georgetown Forebay Dam and Reservoir and the Clear Lake Dam and Reservoir are to the south of the GSPNHLD. The Georgetown Forebay Dam and Reservoir is a rock filled structure with a concrete anchorage and an interlocking steel piling face. The Dam was built in 1902 and subsequently modified in 1936. It is currently used for water impoundment for hydroelectric power generation and the City of Georgetown water supply. Clear Lake Dam and Reservoir also provides water impoundment for hydroelectric power generation. These two sites constitute the entire Georgetown Historic Hydroelectric District and have been determined eligible for the NRHP for their association with events that have made significant contributions to broad patterns of our history.

Marshall Tunnel (Site # 5CC178)

The Marshall Tunnel was an important mining center from the late 1870s until well into the 20th century. The tunnel was constructed to intersect many of the most valuable lodes in the Colorado Central Group of mines. The Tunnel was financed by F.J. Marshal, a well-known local investor whose main interests were within the Argentine mining district. This site has been determined eligible for the NRHP for its association with the history of the development of Georgetown and Silver Plume.

Open Lithic Scatter (Site # 5PA41)

This site is located along Guanella Pass Road. This site consists of a non-diagnostic lithic scatter of five artifacts. As the site could not be found during the 1995-1996 inventory, its eligibility for the NRHP could not be assessed.

Open Lithic Scatter (Site # 5CC70)

This site is an open lithic scatter consisting of chert flakes and one biface. Resource procurement, processing, and stone tool manufacture are evidenced at the site. It has been determined eligible for the NRHP due to its association with events that have made significant contributions to broad patterns of our history.

Tumbling River Rock Shelter (Site # 5PA142)

The Tumbling River Rock shelter is a historic site with some evidence of prehistoric use. Since its previous field inspection, this location has deteriorated markedly due to recent picnickers and their debris. There remained no evidence of anything other than recent use. Subsurface testing of the site was completed in November 1999. There was no evidence of subsurface cultural deposits. The site has been determined ineligible for the NRHP.

Town of Grant (Site # 5PA403)

The Schyler Colfax party named the Town of Grant when they passed through the Platte Canyon in August 1868 in honor of Ulysses S. Grant, the Republican nominee for the Presidency. With the coming of the railroad in 1879, Grant became an important supply point for the mines in Geneva Gulch. According to architectural and historical documentation from 1976 to 1977, little of the original village of Grant remains and architecturally it lacks historic integrity. It has been determined ineligible for NRHP listing.

Georgetown, Argentine, Snake River Wagon Road, and the Green Lake Wagon Road (Site # 5CC861.1-1.7)

This site consists of several discontinuous linear features that might have been remnants of the Georgetown, Argentine, Snake River Wagon Road, and the Green Lake Wagon Road (GASRGL). Road segments pass through riparian zones, heavily forested subalpine slopes, and above timberline areas. Wagon roads close to Georgetown were constructed as early as the 1860s, during the Placer Mining era. One isolated segment of the GASRGL, designated as 5CC861.2-3, crosses Guanella Pass Road at the second set of switchbacks south of the Guanella Pass summit. No contemporaneous artifacts were found associated with the road segments. This site has been determined ineligible for NRHP listing.

Mine Tailing Dumps (Sites # 5CC988-993)

Sites # 5CC988-990 consist of mine tailing piles and associated features of the Kirtley Mine, which was in operation from 1860 to 1900. Sites # 5CC991-993 consist of mine tailing piles from three unnamed mines. All six sites have been determined eligible for NRHP listing as contributing elements to the historic landscape of the GSPNHLD and their association with events that have made significant contributions to broad patterns of our history

Farwell Smelter Remains (Site # 5CC994)

This site consists of the remains of the Farwell ore processing and reduction works smelter built between 1872 and 1873. Ore from surrounding mines during Silver Plume and Georgetown's boom period were transported over the Colorado Central Railroad to the smelter. This site has been determined eligible for NRHP listing for its association with events that have made significant contributions to broad patterns of our history.

Guanella Pass Road (Site # 5CC995 / PA1139)

This site is the existing Guanella Pass Road, which was constructed as recently as 1951 under the supervision of Byron Guanella. It has been determined ineligible for listing on the NRHP.

Open Lithic Scatter (Site # 5PA2002)

This site is a sparse lithic scatter suggesting Late Prehistoric or Historic Contact Occupation. Resource procurement, processing, and stone tool manufacture are evidenced at the site. Construction and use of the Duck Creek Picnic Ground has destroyed the integrity of the site. This site has been determined ineligible for the NRHP listing.

Duck Creek Road (Site # 5PA2003/5CC1188)

Duck Creek Road was used between 1880 and 1950 by timber cutting crews to access Duck Creek drainage north of Geneva Park. This site has been determined ineligible for the NRHP listing.

Isolated Occurrences

IOs recorded in the study area include crimped-seam cans and pieces of stoneware, crockery, and bottle glass dated between 1930 and 1950. By definition, IOs are not eligible for listing on the NRHP.

Environmental Consequences

Potential impacts to sites listed on or eligible for the NRHP and recorded within or adjacent to the project area have been considered and are identified as follows:

Georgetown-Silver Plume National Historic Landmark District (Site # 5CC3)

Alternative 1

Alternative 1 will not impact this historic landmark district.

All Build Alternatives

Because Leavenworth Mountain is the backdrop to the historic setting of the GSPNHLD, the Town of Georgetown believes that any improvement of the switchbacks on the existing roadway may adversely affect the visual quality of the cultural landscape within the District. Proposed improvements included in all build alternatives would entail tree removal, cuts and fills, and retaining walls within the existing roadway construction limits. The FHWA has determined that there will be an adverse effect to the GSPNHLD under all build alternatives. Alternative 6 would have the least amount of impact to Leavenworth Mountain due to reduced roadway width, curve radii, and retaining wall height. Construction of the proposed Silverdale Parking Area would not adversely affect the GSPNHLD. If the FHWA adopts construction of a temporary construction traffic bypass bridge to route construction traffic away from Georgetown along Loop Road to the second switchback on Leavenworth Mountain, a portion of the Colorado Central Railroad Grade (Site #5CC3.1/5CC9) would be adversely affected. However, an adverse effect to the Colorado Central Railroad Grade would not adversely affect the GSPNHLD since it would not substantially diminish those qualities for which the GSPNHLD was listed on NRHP. If the temporary construction bypass bridge is not adopted, construction traffic will be routed through Georgetown. This traffic would not produce vibrations sufficient to damage historical structures along the haul route, and consequently would not adversely affect the GSPNHLD (refer to **Chapter III.B.6f: Vibration** for vibration studies conducted in Georgetown).

Colorado Central Railroad Grade (Site # 5CC3.1/5CC9)

Alternative 1

Alternative 1 poses no adverse affects.

All Build Alternatives

Approximately 160 meters (525 feet) of the railroad grade, adjacent to the second switchback of the roadway, would be adversely affected by adoption of the temporary construction traffic bypass bridge along Loop Road. However, Georgetown has rejected the construction of the temporary bypass bridge due to ROW concerns.

Georgetown Forebay Dam and Reservoir (Site # 5CC461.3) and Clear Lake Dam and Reservoir (Site # 5CC461.4)

Both of these sites are outside the area of potential effects (APE) and are not affected by the proposed project.

Marshall Tunnel (Site # 5CC178)

This site is outside the APE. The proposed project does not affect it.

Open Lithic Scatter (Site # 5PA41)

This site could not be found during the 1995-1996 field inventory. The effect of the proposed project on this site remains indeterminate.

Open Lithic Scatter (Site # 5CC70)

Alternative 1

Alternative 1 will cause no adverse effects.

All Build Alternatives

This site would not be adversely affected by the construction of a new parking facility at the summit of Guanella Pass, under all build alternatives.

Town of Grant (Site # 5PA403)

Though this site is outside the APE and it has been determined ineligible for listing on the NRHP, there is the possibility that historic subsurface archaeological deposits that cannot be observed from the surface may be located in the vicinity of Grant. Therefore, archeological monitoring of construction activities will be conducted along the portion of the Guanella Pass Road near the Town of Grant.

Mine Tailing Dumps (Site # 5CC988-993)

Alternative 1

Alternative 1 will not impact these sites.

Alternatives 2,3,5, and 6

Sites 5CC988 (Station 35+200-35+400), 5CC989 (Station 36+100), and 5CC990 (Station 36+300) are located on or adjacent to Guanella Pass Road between Silverdale and the Kirtley Mine and would be directly impacted by build alternatives 2, 3, 5, and 6. Alternatives 5 and 6 would involve rehabilitation of the road at these sites which would result in less direct impact than Alternatives 2 and 3 which would involve full reconstruction of the road at these locations. Full reconstruction requires more overall ground disturbance than rehabilitation. Adoption of Alternative 2, 3, 5, or 6 would not substantially diminish the integrity or qualities of sites 5CC988-990 which meet criteria A (association with broad patterns important in our history) for NRHP eligibility. The impacts to sites 5CC988-990 would not be an adverse effect. The remaining three sites (5CC991-993), located between the third and fourth switchbacks on Leavenworth Mountain, are outside of the APE and are not affected by the proposed project.

Alternative 4

Alternative 4 would consist of no action at these sites and therefore would have no impact.

Farwell Smelter Remains (Site # 5CC994)

This site is outside of the APE and will not be affected by the proposed project.

A more detailed analysis of this topic is provided in the report entitled *An Intensive Cultural Resources Survey along the Guanella Pass Road, Colorado Forest Highway 80, Park and Clear Creek Counties, Colorado* (Henry Walt, 1998).

1h. Traditional Cultural Properties

Affected Environment

An ethnographic Native American study was conducted for the Guanella Pass Road improvement project to identify and evaluate TCPs in compliance with the American Indian Religious Freedom Act (AIRFA), the NAGPRA, and Executive Order 13007 (Indian Sacred Lands). The design of the study included Native American contacts, archival research, field research, meetings, and interviews. Tribes contacted by letter and telephone for the ethnographic study included the Southern Ute, Ute Mountain Ute, White Mesa Ute, Uintah and Ouray Ute (White River and Uncompahgre bands), Eastern Shoshone, Comanche, Northern Arapaho, Northern Cheyenne, and Sioux. The Arapaho NF, Pike NF, and National Park Service were also contacted for their input. Based upon the results of the initial contacts, a site and project area reconnaissance was performed. Some sites were identified during the site and area reconnaissance. Indian trail segments were identified along the route of Guanella Pass Road, and a possible use area was pointed out above the Tumbling River Rock Shelter. One probable vision quest site was identified beyond the APE at the top of Guanella Pass and vision quest

sites, campsites, game drive sites, and trails were reported on both sides of the pass, also well beyond the APE.

Ethnographic and Historic Period Native American Occupants

Guanella Pass is located within the traditional range of the Eastern Ute (Southern, Uncompahgre and White River bands). The Taviwach band of the Uncompahgre Ute was the closest to Guanella Pass, but any of the Ute tribal divisions or bands may have used the area over time. By approximately 1750, other tribes such as the Arapaho, Cheyenne, Comanche, Kiowa, Shoshone, and Sioux entered Ute territory while hunting, warring, or trading. These groups may have used the high country around Guanella Pass as well. During the historic period, the Arapaho and Cheyenne in particular are known to have invaded Ute territory in the mountains. In turn, the Ute ventured into Arapaho and Cheyenne country on the plains east of Denver to hunt bison.

Ethnographic Cultural Context

Before the Eastern Ute acquired the horse, they practiced a nomadic hunting and gathering way of life, similar to their Western Ute relatives. The main social and economic unit was the extended family group, which hunted and gathered together most of the year. These extended family groups met with other family groups only for a brief period in the spring. Leadership was limited, with status and differentiation based solely on age, sex, and generation.

With the acquisition of the horse, the Eastern Ute took on the cultural traits of the horse and buffalo complex, becoming like the other Plains tribes. Band organization was broadened and strengthened as the Eastern Ute established larger groups, political leadership, fortified encampments, and organized warfare.

Historic Cultural Context

The Escalante explorations in 1776 and 1777 documented Ute territory and some elements of their culture. These and other explorers were followed by trappers, miners, and settlers who eventually managed to push the Ute out of their traditional homeland. The Eastern Ute were not substantially affected by white expansion until approximately 1850, whereas the Western Ute felt the pressures of white encroachment earlier. During the 1850s and early 1860s, the discovery of precious minerals and the rush for land led to serious conflicts between non-Native Americans and the Eastern Ute, with subsequent pressure on the government to remove the Eastern Ute from Colorado. In a series of agreements and treaties negotiated between 1860 and 1880 the Ute ceded most of their lands in Colorado, retaining only two small reservations in the southwest corner of Colorado, currently occupied by the Southern Ute. The Uncompaghre and White River Ute were moved to the Uintah-Ouray Reservation in Utah. Some of the Eastern Ute remained in Colorado, offering resistance to white intrusion and expansion through the decade of the 1870s.

Environmental Consequences

Alternative 1

Alternative 1 will not impact TCPs or other sensitive Native American sites.

All Build Alternatives

Based on the information gathered from literature and oral history sources, none of the build alternatives will affect TCPs or other sensitive Native American sites. However, Native Americans expressed concerns regarding the project. These concerns included the possible indirect disturbance of cultural sites from increased public access associated with improvement of Guanella Pass Road and projected increases in traffic volume.

A more detailed analysis of this topic is provided in the *Guanella Pass Road Forest Highway 80 Native American Studies Technical Report* (MK Centennial and Woods Cultural Research, Inc., October 1997).

2. Water Resources

2a. Water Quality

Water quality was identified as a key issue of concern during the scoping process. The streams in the project vicinity are used for domestic water supply (after treatment) as well as providing recreational, agricultural, wildlife, and fisheries benefits. Both negative and positive effects would be expected from construction. There are short-term impacts caused by construction activities and long-term benefits from correcting existing erosion problems.

Affected Environment

The primary water resources in the Guanella Pass Road study area are the South Fork of Clear Creek along with its tributary Leavenworth Creek, and Geneva Creek along with its tributaries Scott Gomer Creek and Duck Creek. The South Fork of Clear Creek and its tributary, Leavenworth Creek, flow from the north side of Guanella Pass downstream to the main fork of Clear Creek at Georgetown. Geneva Creek and Duck Creek drain areas on the south side of the pass and flow into the North Fork of the South Platte River at Grant. The eastern side of the major watersheds is bounded by the Mount Evans Wilderness Area, and the western side is bounded by the Continental Divide. The headwaters of these streams are located in alpine terrain at elevations above 3,350 meters (11,000 feet). Elevations at the downstream ends of the study area near Grant and at Georgetown are in the vicinity of 2,600 meters (8,500 feet). The highest mountain areas typically have snow for more than six months each year. The streambed slopes are typically steep, approximately 60 meters/kilometer (300 feet/mile), and flow is turbulent during the peak snow melt runoff periods. The streambeds are composed of boulders and cobbles, although pea gravel, silt, and sand settle in pool and run habitats, in low velocity areas, and around instream obstructions. These sediments also settle on channel bottoms where beaver dams impound the stream and in man-made reservoirs.

The principal source of water to the streams in the Guanella Pass Road study corridor is snowmelt runoff. Lesser amounts of runoff are contributed by rainfall and groundwater seepage (primarily during the summer months). Peak daily flows typically occur in late May or June. One notable trans-mountain diversion feature, the Vidler Tunnel, conveys water from Peru Creek on the west side of the Continental Divide to Leavenworth Creek. Typically, water is diverted through the tunnel only during July and August.

The Colorado Water Quality Control Commission (WQCC) has classified certain segments of the study corridor streams and tributaries for various beneficial uses. In assigning a beneficial

use, it is intended that a stream should support the beneficial use, or the quality of the stream should be improved to support the beneficial use. Water quality standards assigned to a classification are more stringent for lower numbered classes. The following classification information is taken from the WQCC document *Classification and Numeric Standards South Platte River Basin 2*.

- Mainstem of Geneva Creek from source to the confluence with Scott Gomer Creek – Class 1 Cold Water Aquatic Life, Class 2 Recreational.

- Mainstem of Geneva Creek from the confluence with Scott Gomer Creek to the confluence with the North Fork of the South Platte River; all tributaries of Geneva Creek from their source to the confluence with the North Fork of the South Platte River – Class 1 Cold Water Aquatic Life, Class 2 Recreational, and Agricultural.

- Mainstem of South Clear Creek, including all tributaries, lakes, and reservoirs, from source to the confluence with Clear Creek, except for Leavenworth Creek – Class 1 Cold Water Aquatic Life, Class 1 Recreational, Water Supply, and Agricultural.

- Mainstem of Leavenworth Creek from source to confluence with South Clear Creek – Class 2 Cold Water Aquatic Life, Class 1 Recreational, Water Supply, and Agricultural.

Studies

Hydrology and sediment transport related to forest roads have been extensively studied. Several of these studies are summarized and referenced in the United States Geological Survey (USGS) Report 00-4186 (pages 82 and 117, respectively). Sediment production sources and rates measured or estimated on forest roads indicate that cutslopes are a small source of sediment compared to the road surface for gravel roads, ranging from 0.4 percent (heavy-use roads) to 50 percent (light-use roads). The Water Erosion Prediction Project (WEPP) model for analysis of the components of insloping forest roads estimated that the road surface and ditch are more important contributors to sediment yield than the cutslope. Applying crushed rock to dirt roads in 3 to 6 inch lifts has been shown to reduce road-surface sediment production by 70 to 92 percent compared to unprotected roads. Heavy-use gravel roads in a Washington forest were estimated to produce 250 times more sediment than paved roads, on average. Sediment production was 4 to 17 times greater on a road with marginal quality aggregate compared to good quality aggregate. Paving resulted in a 97 percent reduction of road-surface sediment production in an Idaho experiment.

An interagency meeting was held in 1994 to discuss water quality issues, including the availability of existing data and studies needed or desired for the proposed project. The meeting included representatives from the FHWA, FS, Denver Water Board, Park County Advisory Board on the Environment, Colorado Division of Water Resources, Clear Creek Watershed Association, Colorado Department of Public Health and Environment (CDPHE), and the USGS.

Under contract with the FHWA, the USGS performed water quality studies in the project area during 1995 to 1997. Much of the information in this section is based on data from these studies. All of the hydrologic and water quality data has been published in USGS Reports 00-4186 (*Assessment of Water Quality, Road Runoff, and Bulk Atmospheric Deposition, Guanella Pass Area, Clear Creek and Park Counties, Colorado, Water Years 1995-97*), 00-82 (*Hydrologic, Water Quality, Sediment Transport, and Bulk Atmospheric-Deposition Data, Guanella Pass*

Area, Colorado, October 1, 1994, through September 30,1997), and 00-54 (*Evaluation of Biological Data, Guanella Pass Area, Clear Creek and Park Counties Colorado, Water Years 1995-97*).

Data was collected during the 1995 to 1997 period from over 70 sites throughout the project area, including stream water quality sampling sites, road runoff sites, ground water sites, lake/reservoir sites, snow precipitation sites, bulk atmospheric deposition sites, and biological sampling sites. The collected data included measurements of stream flow, specific conductance, pH, water temperature, turbidity, barometric pressure, dissolved oxygen, suspended sediment concentration and particle size analyses, solids concentrations of bulk atmospheric deposition, benthic invertebrate density, and concentrations of selected major ions, nutrients, and trace elements.

Water quality monitoring of Clear Creek is also conducted eight times per year in a joint effort by the Upper Clear Creek Watershed Association (UCCWA), the Standley Lake Cities, and the EPA. One of the monitoring sites is on South Clear Creek, just above the confluence with Leavenworth Creek. This site is close to one of the seven Clear Creek monitoring sites of the USGS study.

Primary Drinking Water Standards

The Federal Safe Drinking Water Act and the Federal Water Pollution Control Act (renamed the Clean Water Act [CWA] in 1972) established standards for water quality to protect human health and aquatic life. The EPA, under the authority of the Safe Drinking Water Act, has established nationwide Primary Drinking Water Standards (Human Health Standards) in the form of Maximum Contaminant Levels (MCLs) for a number of constituents. The State of Colorado has adopted the EPA's MCLs for use as state standards. Waters used for drinking water supply should not exceed the MCLs at the tap. None of the levels found at ground water sampling sites exceeded the MCLs.

Aquatic Life Standards

Under authority of the CWA, the EPA has empowered the State of Colorado to set water quality standards to protect aquatic life. Some aquatic life standards are absolutes, while others are computed as a function of other variables such as hardness. Aquatic life standards also take the form of either acute standards (not to be exceeded at any time) or chronic standards (not to be exceeded beyond a designated duration). As part of the USGS study, variable aquatic life standards were estimated using methodology provided by staff of the Colorado WQCC. Samples were tested for 21 constituents.

Surface waters in the study area had low total dissolved solids, nutrients, and dissolved metals. Acidic drainage from the bedrock geology or abandoned mine workings affects Geneva Creek and Leavenworth Creek. This acidic drainage resulted in higher metals (iron, lead, and zinc) concentration. Some samples from Clear Creek exceeded chronic limits for iron, manganese, cadmium, lead, and zinc. Some samples from Geneva Creek exceeded chronic limits for iron, lead, zinc, copper, and silver, as well as acute limits for zinc and copper. This does not mean that these constituents are present in drinking water. Georgetown municipal water comes from a water intake on South Clear Creek and is processed by a water treatment plant before reaching the tap.

The publication *State of the Watershed Report-Clear Creek 1997*, produced by EPA Region 8 and the CDPHE, states that the water quality in the South Fork of Clear Creek is relatively good compared with other Clear Creek tributaries. Leavenworth Creek, however, has been impacted by past mining activity close to the creek's headwaters. Many of the metals, especially zinc, copper, and cadmium, are toxic to fish and other aquatic life of Clear Creek. Although people are generally less sensitive to metals than fish, manganese has been a concern of municipalities that use Clear Creek for their drinking water.

State Water Quality Standards

The water quality required for state-classified water uses must be sustained to comply with antidegradation policy. In March 1998 the CDPHE issued Colorado's 1998 303(d) list of water quality limited stream segments. The list was prepared to fulfill section 303(d) of the federal CWA.

Geneva Creek from the confluence with Scott Gomer Creek to the confluence with the North Fork of the South Platte River is on the State 303(d) list with a status of Partially Supporting for the designated use of Cold Water Aquatic Life, which means the designated use exhibits some interference, but is not precluded. 303(d) status means water quality within the segment must be improved and not further degraded. This segment is listed because of impairment from zinc and metals contamination. The USGS water quality study collected samples at stream-sampling sites adjacent to the Guanella Pass Road for Colorado water quality standards. Generally, the total recoverable iron chronic standard was exceeded most frequently. Zinc standards were exceeded numerous times at the Geneva Creek GC11 site. Total phosphorus concentrations in storm runoff of Guanella Pass occasionally exceeded the EPA guideline. The FS recommended to the CDPHE in July, 2002 that sediment be recognized as another source of stream impairment.

The designated uses for South Clear Creek are Aquatic Life Cold 1, Recreation 1, Water Supply and Agriculture and it is not listed on the State 303(d) list. Although South Clear Creek is not a 303(d) listed stream, metal contamination is still a concern.

Biological Samples

Biological samples indicate that most sites within the study area have reasonable populations of aquatic insects and algae; however, there is wide variability in macroinvertebrate taxa richness, density, and diversity. Geneva Creek has low pH and higher than background trace element concentrations and a degradation in invertebrate and algal communities. Reduced and degraded populations of macroinvertebrates were found in Geneva Creek upstream of the confluence with Duck Creek. Samples from Geneva Creek at Grant and South Clear Creek above Naylor Creek and above Lower Cabin Creek had relatively low values for taxa richness and density. Samples with relatively high values were taken from the mouth of Leavenworth Creek and from Duck Creek near the confluence with Geneva Creek.

Although the USGS report found that generally the aquatic biology in the streams is reasonably healthy, there is evidence of detrimental affects to habitat quality from sedimentation. Sediment affects macroinvertebrates by filling the space between rocks in the stream bottom, which reduces the amount of usable habitat. One reason why the report did not show extreme examples of adverse effects may be because the beaver dams in South Clear creek trap sediment. There are at least two recently abandoned beaver dams below Naylor Creek, with sediment deposition in the dams about a meter (3 feet) deep.

Sediment

Sediment is a concern because it fills reservoirs and affects aquatic life. The "Characterization of Guanella Pass Road Runoff" section of the USGS report has a lengthy discussion of the various sources of sediment along Guanella Pass Road, complete with photos and maps. Measured suspended sediment concentrations were small in low flow samples and were larger, with considerable site-to-site variation, in high-flow samples. Instantaneous suspended sediment discharge for high flow samples ranged from less than 1 mg/L at many sites during low flow to 1,180 mg/L at one site (CC2) during storm flow. Median concentrations were generally less than 20 mg/L (USGS Report 00-4186).

FS direction is to manage streams to prevent suspended sediment from exceeding 250 mg/L over a one-hour period or from ever exceeding 500 mg/L. Instantaneous measured suspended sediment concentrations along Geneva Creek and Clear Creek showed that these limits were rarely exceeded even during high flow. At low flow, suspended sediment concentrations were in the range of 1 to 9 mg/L. While sediment concentrations increase in a downstream direction along Geneva Creek, they decrease in a downstream direction along Clear Creek. The decrease is due to the relatively low suspended sediment contributions from tributaries and the settling out of suspended sediment in reservoirs and beaver dams. In a letter dated July 12, 2002 (included in **Appendix A: Interagency Correspondence**), the FS recommended to the CDPHE that Geneva Creek be added to the 303(d) list as impaired due to sedimentation.

FS direction is to control sediment in streams so that it does not reach levels which reduce reproductive success of fish or cause a decline in macroinvertebrate biomass or diversity. In general, the stream gradient in the area is steep, which tends to keep finer grain sizes in suspension. Sediment deposits at the inlets to lakes or reservoirs are conspicuous in only one area: where South Clear Creek enters Georgetown Reservoir, a large alluvial fan has developed. The likely source of the sediment is Leavenworth Creek because the other tributary stream, South Clear Creek, is located below Lower Cabin Creek Reservoir and Clear Lake, which trap much of the sediment from the upper part of the basin.

To estimate sediment production from typical road sections of Guanella Pass Road, an abbreviated version of the WEPP Road Model was used. This model is an interface for the WEPP soil erosion model that allows users to describe numerous road erosion conditions. The FS, Rocky Mountain Research Station and San Dimas Technology and Development Center developed this model. Results are included in the technical report: *Sedimentation Problems Identified on the Guanella Pass Road - Aquatic and Soil Resource Recommendations* (FS, October 25, 2001).

The USGS report shows a greater than 500 times increase in suspended sediment for a sampling site during a storm event, while the water discharge increased by only 1.31 times pre-storm conditions. The report dismissed bank, streambed, and surface erosion as minor contributors, and cited runoff from the road as the likely source of the large increase in sediment. WEPP Road Model outputs show that those road sections which are unpaved and are either immediately adjacent to a perennial stream or are within 30 meters (100 feet) of a perennial stream produce the most sediment into the adjacent stream.

The WEPP Road Model indicates that paving (or applying a hardened surface that does not erode) those sections of unpaved road that are adjacent to perennial streams could reduce sediment from entering the streams by 159 kilograms per 100 meters (350 pounds per 330 feet)

of road per year, or 1,592 kilograms per kilometer (5,650 pounds per mile) per year. The model also indicates that applying pavement (or applying a hardened surface that does not erode) to currently unpaved road sections within 30 meters (100 feet) of streams would substantially reduce sediment from entering the streams. This model run only estimated sediment from the road surface. It did not consider unstable cut and fill slopes, drainage features or maintenance practices.

Lakes

Green Lake exhibits higher concentrations of zinc and other metals in bottom sediment than other lakes and reservoirs in the study area. Duck Lake and Clear Lake stratify during the summer, becoming oxygen poor in the near-bottom water layer.

Roadway Runoff

Road length between culverts, road gradient, and surface type are important factors in erosion of the road surface, while ditch length and roughness are important factors in ditch erosion. Because the existing road does not have enough culverts, water gathers velocity, which degrades ditches and increases erosion. Sheet flow across the road adds to sedimentation that is transported into aquatic habitat. The USGS study estimated the effects of storm water runoff from the unpaved sections of Guanella Pass Road. This runoff has much higher concentrations of nutrients, suspended sediment, organic carbon, and trace metals than ambient stream flows. Trace elements from roadway runoff tend to be in particulate form, reducing their toxicity to aquatic life. The source of suspended sediment in road runoff was observed to be the unpaved roadbed and erosional areas of non-vegetated road cuts and exposed downslope road embankments. Snowmelt runoff from the road is believed to have little influence on stream-suspended sediment concentrations because of the relatively strong effects of dilution at high flow. Greater potential for increased suspended sediment exists during summer rainstorms because low flow of the stream is inadequate for effective dilution.

Many of the road cuts on the existing road have either failed to revegetate naturally or support only marginal amounts of vegetation. When the road was originally constructed, many of the cuts into the hillside were overly steep and continue to erode. Materials slide or are washed down by rain and snowmelt. Road maintenance crews remove materials at the toe of cuts to maintain shoulders and ditches, continuously upsetting slope stability (Figure III-5a). Management practices such as the grading of roads and ditches increase sediment yield by pushing roadway materials outside of the original construction boundaries (Figure III-5b). Once mobilized, these erosion products can be transported into streams.

Unstable cut slopes seem innocuous because the ditch and road trap material falling off the slope, but in fact they may contribute substantially to sedimentation of streams. Soil and rocks fall into the ditch below the cut slope. Snowmelt, storms and other runoff runs down the ditch, picks up the sediment and flushes it down the ditch. Typically ditches are drained by a culvert under the road that carries the material either into a stream, or onto a slope below the road (Figure III-5c).

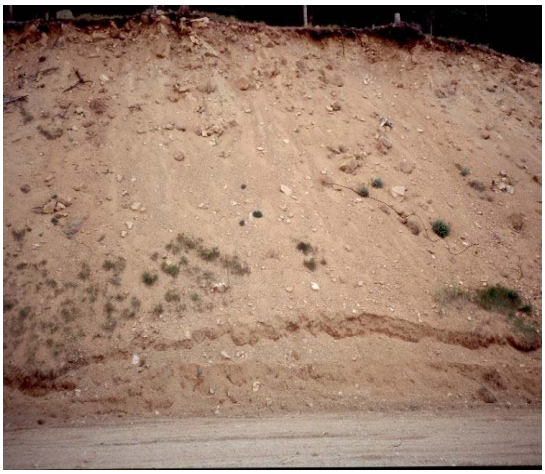


Figure III-5a: Unvegetated, unstable cut slope with toe of slope undercut.

Figure III-5b: Roadway maintenance has pushed the road beyond its original boundaries.

The proximity of the road to streams results in generally short buffer zones between the road and stream that do not allow for the removal of particles suspended in water or air. In some areas, such as along the lower reaches of Geneva Creek near Grant, the sideslope of the roadbed erodes directly into the stream (Figure III-5d). Because the road in some areas occupies part of the pre-road floodplain, the stream morphology (meanders, pool/riffle distribution) has been altered. This has resulted in erosion of stream gradient, creating less suitable habitat for aquatic life. Areas observed to have short buffer zones, steep slopes, and ditch or culvert inputs to the stream are shown in Figure III-6.

Figure III-5c: Sediment discharge from a 'hanging' culvert erodes a slope and deters vegetation growth.

Figure III-5d: Area of Guanella Pass Road where the roadbed erodes directly into Geneva Creek.

The FS identified priorities for water resource protection for different sections of the Guanella Pass Road (*Sedimentation Problems Identified on the Guanella Pass Road Aquatic and Soil Resource Recommendations* [FS, October 25, 2001]).

The three categories of priority are:

1) road sections immediately adjacent to a perennial stream channel, stream crossing, or wetland;

2) road sections within 30 meters (100 ft) of a perennial stream channel; and

3) road sections greater than 30 meters (100 ft) from a perennial stream channel.

A total of 5.8 kilometers (3.6 miles) is classified as priority 1, 14.9 kilometers (9.3 miles) is priority 2, and 17.4 kilometers (10.8 miles) is priority 3. The report states that the major source of sediment from Guanella Pass Road is the road surface.

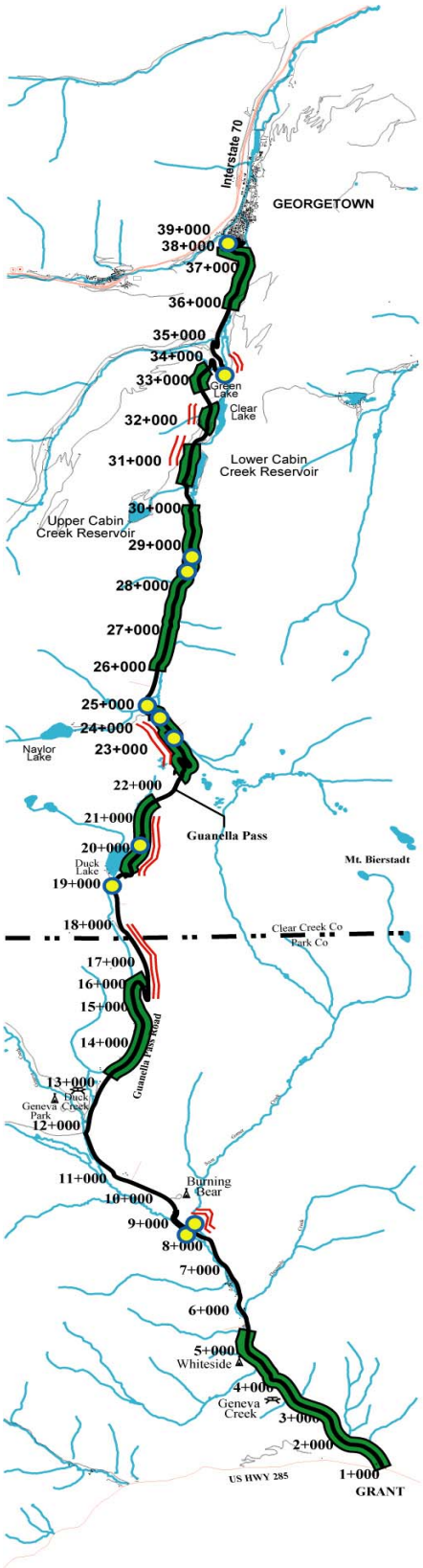
While moderate degrees of slope erosion occur throughout the entire route, the most severe problems are associated with the steepest slopes. This appears to be a problem in the switchback areas above Georgetown, the switchbacks below Green Lake, the switchbacks along South Clear Creek above Naylor Creek, the entire section of the road from the top of Guanella Pass to the beginning of the paved section below the Geneva Basin Ski area, and the Falls Hill section. These areas are potentially large sources of sediment and chemical constituents to streams.

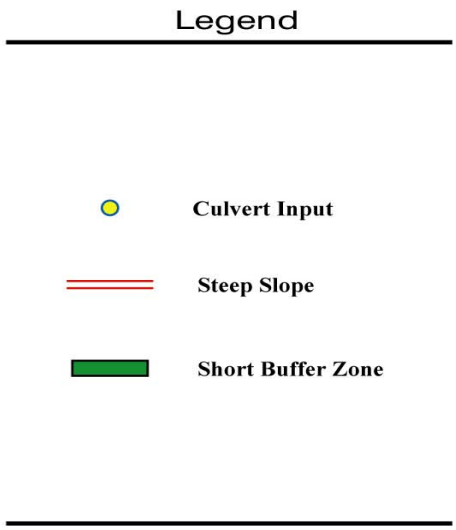
Where buffer zones are capable of absorbing the particles in road runoff, the deposited material can be detrimental to the buffer zone plants. Wetlands and tundra areas are examples of areas susceptible to this type of damage. Two areas of severe damage are present along the Guanella Pass Road. One is in the switchbacks along South Clear Creek above Naylor Creek, where flow from a culvert eroded an approximately 45 meter (150 feet) long area up to 5 meters (15 feet) wide and 3 meters (10 feet) deep in colluvium on the slope. The eroded material not reaching the stream was deposited as an alluvial fan at the base of the slope in a zone of wetlands and riparian areas.

The other area receiving large amounts of deposited material is located 1.6 kilometers (1 mile) south of the top of Guanella Pass. A culvert discharges sediment onto an area of willow and tundra plants. The area covered by sand and gravel deposits is quite extensive. Small tundra plants were eliminated by the deposit and even willows do not grow on the thickest part of the deposit.

Dust

As part of the USGS study, bulk atmospheric deposition (dust, etc.) was measured at various locations in the vicinity of Guanella Pass Road. Bulk deposition at the average gravel road site was more than 60 times greater than the reference site (located at least 150 meters [500 feet] from a road) and 24 times greater than the average site next to a paved road surface. The potential direct effects of bulk deposition were estimated for a reach of Geneva Creek along the road. Results indicate that bulk deposition near the gravel road could make up a small fraction (about three percent) of the suspended sediment in Geneva Creek during the late-summer low-flow. Direct deposition is a much smaller part of the total sediment during high flow. It is difficult to estimate the total effect of dust because it is likely that considerably more dust enters the streams by secondary pathways than falls directly onto the water. An unmeasurable, but probably substantial, portion of the dust that falls in the surrounding area also





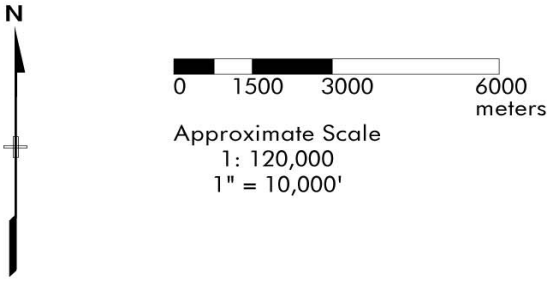


Figure III-6
Identification of Short Buffer Zone, Steep Slopes, and Culvert Input

eventually reaches the stream. In addition, dust from the road contributes to localized impacts where it is adjacent to the Mt. Evans Wilderness and may affect the Class II airshed over the wilderness area. In an attempt to counter the dust problem, Clear Creek County has used dust suppressants on an as-needed basis since 1990. Park County has not used dust suppressants on this road.

Dust Control Chemicals

Clear Creek County has applied $MgCl_2$ to the unpaved sections of the road to control dust. It was initially applied in 1987 with additional applications in 1993 and 1998. Based on the USGS reports, the mass of $MgCl_2$-derived chloride from these three applications is estimated at 51.8, 10.4, and 14.1 metric tons (57.1, 11.5, and 15.5 tons, respectively). The average annual mass of chloride, from both natural and man-made sources, transported in South Clear Creek at a point below the affected area was 12.5 metric tons (13.8 tons) per year for the period 1995 to 1997.

The USGS study calculates that the flow-weighted mean concentration of $MgCl_2$-derived chloride increases by about 3 to 12 times the original concentration. This assumes that the entire mass of chloride applied would be flushed from the basin in a single year. In the case of the largest increase, the annual flow-weighted mean concentration in 1996 (0.5 parts per million [ppm]) might increase 12 times (to 5.9 ppm). This remains well below the concentration determined to be harmful to plants, fish, and aquatic life. Water quality criteria for chloride (Cl), $MgCl_2$, and Sodium Chloride (NaCl) are included in Table III-8.

Deicing Salts

Guanella Pass Road is located in a high-elevation area with relatively high precipitation compared to Denver. The amount of precipitation and runoff tend to both dilute the salt concentrations and make them highly mobile. Increased dilution often reduces peak-flow salt concentrations in streams to levels that are comparable to or lower than pre-storm base-flow conditions.

Winter maintenance of the Clear Creek County portion of Guanella Pass Road has included the application of traction gravel with a NaCl content of approximately three to six percent. The traction gravel has only been applied on the paved section of the road from Georgetown to the Cabin Creek Reservoir. Traction gravel has not been applied to the upper dirt section of the road or to the summit area by Clear Creek County. Park County applies salt to the road in winter on some occasions. Park County roads that do receive more intensive traction sand/deicing salt application receive about 0.4 metric ton per kilometer (0.8 ton per mile) of salt annually.

To put this in perspective, many roads annually receive more than 27 metric tons of salt per kilometer (50 tons per mile) (*Highway-Wildlife Relationships, Volume 1:18-19* (FHWA, 1975)). The relationship between tons per kilometer and concentrations of salt in the surrounding soil is dependent on many local factors such as drainage patterns, soil properties, and precipitation type, amount, and distribution. Concentrations of sodium chloride up to 600 ppm in the soil can stimulate growth of grasses, but injury becomes more pronounced as concentrations increase from 1,000 to 5,000 ppm. These are very high and unusual concentrations, as indicated by a Maine study (*Highway Research Record 1993:1-7* (Hutchinson & Olson, 1967)) in which the average concentrations for 22 highway sites selected at random, some of which had been salted for 20 years, were 275 ppm sodium and 100 ppm chloride at a 15-centimeter (6 inch) depth

immediately adjacent to the road. The EPA uses 250 ppm as an upper limit for chloride in drinking water in its secondary regulations. Trout are adversely affected at 400 ppm.

Field studies measured salt concentrations of soils near the Guanella Pass summit (*Literature Review and Report of Limited Field Examination, Use of Road Salts on Guanella Pass Road*). The highest contents of sodium, potassium, calcium, and magnesium measured were, respectively, 0.184, 0.020, 0.120, and 0.032 ppm. Drinking water criteria for these elements are 10 ppm for sodium and 340 ppm for potassium. There are no drinking water criteria for calcium and magnesium. Criteria for effects on fish and wildlife are 85 ppm sodium, 50 ppm potassium, 52 ppm calcium, and 14 ppm for magnesium. Although there is evidence of off-road transport of salts to accumulation sites in adjacent natural ecosystems, the levels of accumulation to date are not likely to cause any negative effects on plants present, and no damage to native vegetation cover attributable to salt was observed during field studies.

Table III-8
Water Quality Criteria – Chloride/$MgCl_2$/NaCl

Chemical	Use/Affected Environment	Concentration (parts per million)	Comment
Cl	Municipal	250	U.S. Public Health Service 1962 Drinking Water Standards
Cl	Stock & Wildlife	1500	Safe level for cattle, sheep, swine, chickens
Cl	Irrigation	100-1500	Harmful to most plants
Cl	Fish & Aquatic Life	400	Harmful to trout
Cl	Fish & Aquatic Life	4000	Harmful to bass, pike, and perch
$MgCl_2$	Municipal	168	Level will prevent salty taste
$MgCl_2$	Fish & Aquatic Life	476	Lethal to minnows in 4 to 6 days
NaCl	Municipal	200-900	Taste threshold
NaCl	Municipal	250	EPA secondary regulations
NaCl	Municipal	1000-1500	Renders drinking water unpalatable
NaCl	Stock & Wildlife	<1025	Usually causes no adverse effects
NaCl	Fish & Aquatic Life	5850	Not harmful to salmon eggs
NaCl	Fish & Aquatic Life	2000	Recommended limit in fresh waters

Source: Water Quality Manual, Volume V, "Chemical, Bacteriological, and Ecosystem analysis of Water from Highway Sources for Environmental Impact Studies"

Environmental Consequences

The ability of an alternative to repair existing drainage and erosion problems is partially dictated by the type of reconstruction used in that alternative. Full reconstruction provides the most opportunity for repair, followed by light reconstruction, rehabilitation, and no action. The other major factor in reducing sedimentation is hardening of the roadway surface.

Construction provides opportunities to improve existing conditions that degrade water quality, such as eroding roadway ditches, shoulders, and embankments as well as deteriorated or insufficient culverts. Although many areas would need to be treated on a case by case basis, many benefits are obtained through the employment of BMPs and an aggressive revegetation program. BMPs for erosion and sediment control are used as both temporary measures during construction and permanent measures for long-term pollution prevention. The BMPs committed for this project are outlined in the Technical Memorandum: *Best Management Practices (BMPs)* (FHWA, June, 1998). Typical BMPs which will be used are described under **Chapter IV.C: Water Quality**. CWA Section 401 (State Water Quality Certification) and 402 (NPDES) permits will be required for all build alternatives. These permits are obtained from the WQCD of the CDPHE and the EPA, respectively.

Erosion of New Slopes

Alternative 1

Alternative 1 would not create any new slopes.

Alternatives 2 - 6

Even with the implementation of BMPs, increased erosion and associated sedimentation is expected for all build alternatives initially during construction and from new slopes before vegetation becomes established. Runoff from new slopes would contain higher concentrations of metallic ion constituents which adversely affect aquatic life, but this would be minimized by topsoiling and revegetating. Repair of eroding areas along the road would reduce the contribution of these constituents. Based on the size of the watersheds and relatively large contributions of these constituents from sources outside of the immediate project area, it is not anticipated that any of these alternatives would create a noticeable change in these metallic ion constituents.

Increased erosion from new cuts and fills is mainly a short-term impact before slopes are stabilized and vegetation becomes established. Steep slopes that can not revegetate will be composed mainly of solid rock. In general, slopes are designed to be less steep than the existing slopes to promote revegetation. The erosion control plan will address newly constructed cut and fill slopes. Silt fences, straw bales, temporary seeding and matting, and sediment ponds will be used as necessary to reduce the amount of sediment that reaches streams.

Erosion from new slopes for each alternative would be proportional to the amount of reconstruction, which is 100 percent under Alternatives 2 and 3, 51 percent under Alternatives 4 and 5, and 37 percent under Alternative 6. Alternative 6 will also have less impact because the roadway cross section is narrower than the other alternatives, and because only half of the reconstruction is full reconstruction.

Repair of Existing Erosion/Sedimentation Problems

Alternative 1

Alternative 1 does not allow for the repair of any existing erosion or sedimentation problems. Sedimentation problems identified in the Affected Environment section would not be corrected.

Alternatives 2 - 6

The effectiveness of an alternative in reducing erosion and sedimentation is proportional to the amount of surface hardening and to the amount of reconstruction, which provides opportunity for repairing existing erosion problems and improving drainage. Repairs and improvements can be made under any type of construction, from full reconstruction to rehabilitation. Although the rehabilitation and light reconstruction types of construction do not preclude environmental enhancement work outside of the normal construction limits, alternatives that have more construction provide more opportunities to perform this work.

The FS report *Sedimentation Problems Identified on the Guanella Pass Road Aquatic and Soil Resource Recommendations* (October 25, 2001) identifies erosion control priorities along Guanella Pass Road. For any type of construction, from rehabilitation to full reconstruction, existing problems would be addressed in accordance with the findings of this report where practicable. There are restrictions on the amount of work that can be done under Alternative 5 in the rehabilitation areas, and under Alternative 6 in the light reconstruction and rehabilitation areas. Alternatives 2 and 3 have the most construction, followed by Alternatives 4 and 5, with 51 percent full reconstruction, then Alternative 6 with 37 percent reconstruction (full and light combined) and 63 percent rehabilitation.

Overall, Alternative 2 provides the greatest degree of erosion and sedimentation improvement because it reconstructs and paves the entire road, followed in effectiveness by Alternatives 6, 5, 4, then 3. Alternatives 5 and 6 would have very similar effects because they both have about same amount of surface hardening (either pavement or alternative surface type), and although Alternative 5 has more reconstruction, Alternative 6 has a narrower roadway width. Alternative 5 would be better than Alternative 4 because some sections of Alternative 4 would not be reconstructed or rehabilitated. Alternative 3 would have a gravel surface for 52 percent of the route. Sections of any alternatives that are resurfaced with gravel would initially be more stable than the existing roadway; however, these sections would deteriorate faster than a paved surface, and would require frequent maintenance.

Roadway fill slopes that are being eroded by streams would generally be repaired by replacing the loose soil at the edge of the road with large rock. Other eroding cut and fill slopes would be topsoiled and revegetated. Settling basins, additional culverts, energy dissipaters, and other erosion control features would be included in reconstruction sections. At stream crossings throughout the route, culverts with natural bottoms would be placed to allow the channels to change elevation, within limits, without restriction. Where practicable, the roadway would be moved away from the stream, allowing it to meander more naturally. In other cases, retaining walls or riprap would be used to stabilize the roadway embankment and prevent further erosion. Table III-9 summarizes and compares the water quality-related characteristics of all alternatives.

Table III-9
Comparison of Alternatives by Water Quality-Related Roadway Characteristics

	Major Stream Crossings	Number of New Culverts	Paved Ditch Meters (Feet)	Unpaved Ditch Meters (Feet)	Curb & Gutter Meters (Feet)	Road within 50 Meters of Stream Meters (Feet)	Surface Type Gravel	New Cut or Fill Slopes Hectares (Acres)	Existing Stable Slopes to Remain Hectares (Acres)	Existing Unstable Slopes to Remain Hectares (Acres)	Temporary Erosion Surfaces* Hectares (Acres)	Permanent Erosion Surfaces** Hectares (Acres)
Alternative 1	10	0	0 (0)	38,014 (124,724)	0 (0)	14,186 (46,544)	52%	0 (0)	14.02 (34.64)	14.61 (36.10)	28.72 (70.97)	28.72 (70.97)
Alternative 2	8	200	9,720 (31,891)	26,691 (87,573)	1,761 (5,778)	14,045 (46,082)	0%	38.73 (95.7)	4.82 (11.91)	8.32 (20.56)	54.03 (133.52)	8.32 (20.56)
Alternative 3	8	200	9,720 (31,891)	26,691 (87,573)	1,761 (5,778)	14,045 (46,082)	52%	38.73 (95.7)	4.82 (11.91)	8.32 (20.56)	68.57 (169.43)	26.44 (65.33)
Alternative 4	8	105	2,722 (8,931)	33,743 (119,711)	1,761 (5,778)	14,045 (46,082)	15%	22.79 (56.31)	9.55 (23.60)	10.02 (24.76)	39.50 (97.60)	14.21 (35.12)
Alternative 5	8	200	2,722 (8,931)	33,743 (119,711)	1,761 (5,778)	14,045 (46,082)	15%	22.79 (56.31)	9.55 (23.60)	10.02 (24.76)	40.56 (100.23)	14.21 (35.12)
Alternative 6	8	200	2,300 (7,500)	35,900 (117,800)	1,761 (5,778)	14,045 (46,082)	14% ***	15.41 (38.08)	11.13 (27.50)	11.63 (28.74)	36.15 (89.32)	15.22 (37.60)

* Temporary erosion surfaces are calculated as the sum of the areas of gravel road surface, unstable slopes, new slopes, and foreslopes.
** Permanent erosion surfaces are calculated as the sum of areas of gravel road surface and unstable slopes.
*** 30 percent of Alternative 6 is proposed to be surfaced with the stabilized gravel option of macadam.

It is expected that the long-term benefits of stabilizing existing erosion problems and reducing sediment runoff, along with implementation of high altitude revegetation techniques, will provide a net benefit to water quality.

Deicing Salts

All Alternatives

Although there are no plans to change the existing frequency of winter maintenance, an increased demand to keep an improved road open is likely for all build alternatives. Sites where roadside runoff is collected could be expected to possess higher concentrations of salts. This includes not only roadside ditches but also areas where water is impounded, such as beaver dams or reservoirs. A worst-case condition could result when salt that has accumulated in snow along the road is released into streams by a sudden melt. This is more likely to occur when a road is plowed so that snow and salt are moved into or adjacent to streams. Since salt is not normally used on gravel sections of road, effects would be greater for those alternatives with greater pavement or hardened surface. The most impact would be expected under Alternatives 2, followed by 6, then 4 and 5, then 3. Alternative 1 would have similar effects to Alternative 3 because both have about 52 percent gravel. Although salt would probably not be used as a deicer on gravel sections, this would be at least partially offset by the application of $MgCl_2$, which would be needed as a dust suppressant.

Based on the flow-weighted mean concentration calculations and using a conservative average of 0.5 tons/mile/year of NaCl for deicing, it would be expected that the mean concentration of NaCl would be about 0.5 ppm. Water quality criteria for NaCl are included in Table III-8. To exceed drinking water criteria, sodium levels have to increase by more than 50 times the highest salt concentration measured in the Guanella Pass soil samples. To affect fish and wildlife, levels have to increase more than 400 times. More detailed information is included in the *Literature Review and Report of Limited Field Examination, Use of Road Salts on Guanella Pass Road* (MK Centennial and ESCO Associates, Inc., April, 1997) and *Assessment of Water Quality, Road Runoff, and Bulk Atmospheric Deposition, Guanella Pass Area, Clear Creek and Park Counties, Colorado, Water Years 1995-1997* (USGS, 2001).

If winter closure or no winter maintenance is implemented for a portion of the road, deicing salt use will not be necessary for the roadway that lies between closure points or within the area of no winter maintenance.

Roadway Contaminants

All Alternatives

Pollutants come from a variety of vehicle and roadway sources: pavement wear, tire wear, auto-body rust, motor oil, grease, brake lining wear, antifreeze and hydraulic fluid leaks, and exhaust, including engine wear components as well as combustion products. Metals such as lead, zinc, iron, and copper are included along with petroleum products and other chemical compounds. The amount of these contaminants and their effects on the surrounding environment is to a large extent proportional to the amount of traffic on the road. The *FHWA Report on Effects of Highway Runoff on Receiving Waters, Vol. II* (August,1985), concluded that rural highways with traffic volume under 30,000 vpd (average) exert minimal or no impact on the aquatic components of most receiving waters from these types of pollutants.

Chemical binders in the proposed gravel surface options may contribute to the roadway contaminants already present including those from the vehicles and maintenance activities. The amount of these contaminants and their effects on the surrounding environment to a large extent is proportional to the traffic volume on the road. The FHWA has investigated the potential for leaching impacts that might result from the use of alternative surface types. The literature review revealed that very little research has been performed for the non-asphalt surfacing types (Magnesium Chloride/PennzSupress D, Road Oyl, and Permazyme). Table III-10 presents the research data regarding the potential leaching and runoff impact the Alternative 6 surfacing alternatives have on water quality.

Table III-10
Potential Leaching and Runoff Impacts of the Alternative Surface Types

Surface Type	Impact(s)
Magnesium Chloride/PennzSupress D	These agents contain no solvents and are non-corrosive.
Macadam Construction	This type of surface includes the use of liquid asphalt as a binder. Liquid asphalt is waterproof and tightly binds to the aggregate. As a result, no leaching is anticipated from this surface type.
Road Oyl	Testing was done on Road Oyl as part of the U.S. EPA's National Estuary Program. Samples of soil freshly treated with Road Oyl emulsion were collected from a road construction project and analyzed for oil and grease, volatile organic analysis, polynuclear aromatic hydrocarbons, and total levels of metals: Arsenic, Barium, Cadmium, Chromium, Lead, Mercury, Selenium, Silver and Zinc. The samples were also analyzed via a full Toxicity Characteristics Leaching Procedure. The levels for all test parameters were below method detection limits (they were "nondetected," or ND). No hazardous components were identified and no leachable levels of any of the test parameters were identified.
Permazyme	Manufacturer's specification indicates that Permazyme is not harmful to plant life, is non-toxic and non-hazardous. Permazyme is frequently used as a lake, pond, and irrigation canal liner. It is non-toxic and approved for use by the EPA.
Recycled Asphalt	This type of surface includes the use of liquid asphalt as a binder. Liquid asphalt is waterproof and tightly binds to the aggregate. As a result, no leaching is anticipated from this surface type.
Chip Seal over Asphalt	This type of surface includes the use of liquid asphalt as a binder. Liquid asphalt is waterproof and tightly binds to the aggregate. As a result, no leaching is anticipated from this surface type.

Dust

Dust not only settles on water directly, but is washed into streams from wherever else it settles. The dust contribution by each alternative is proportional to the amount of unpaved roadway (see **Chapter II.D.2: Percentage of Pavement Sections**). Although dust affects air and visual quality, it does not appear, based on the USGS study, that dust is a major contributor to stream sediment.

Alternative 1 (No Action) and Alternative 3 are expected to produce the greatest amounts of dust of all the alternatives due to the high proportion of unpaved road associated with these

alternatives (52 percent). Alternative 2, with no unpaved portion, would produce the least dust. Similar amounts of dust would be produced by Alternatives 4 – 6, with 12 to 15 percent gravel roadway. Effects to water quality from leaching of dust suppressant chemicals would also occur in proportion to the amount of gravel surfacing.

Dust Control Chemicals

Based on water quality criteria (Table III-8), the amount of chemical applied (typically $MgCl_2$) is not sufficient to adversely affect water quality. These chemicals may, however, adversely affect plant life immediately adjacent to the road, and may attract animals in search of salt to the road where they are at risk from vehicles. Potential for impacts from dust control chemicals is greater for the alternatives with less hardened surfacing. Alternative 2 would have no gravel, Alternative 6 would have 14 percent gravel, Alternatives 4 and 5 would have slightly more gravel, and Alternatives 1 and 3 would be the worst case with each having about 52 percent gravel.

Accidental Spills

The probability of chemical spills into streams increases with increased traffic, higher speeds, and more commercial traffic; however, all construction alternatives incorporate consistent design standards that minimize the conditions that contribute to accidents. Although the proposed improvements are not intended to promote high-speed or commercial traffic, the counties and/or Georgetown may find it appropriate to place restrictions on commercial traffic at some future time. Reporting requirements for spills that might occur during construction will be included in any construction contract.

2b. Wetlands

Affected Environment

Wetlands are protected under Section 404 of the CWA. The EPA's Section 404(b)(1) guidelines state that impacts to wetlands must be avoided where practicable. If avoidance is not practicable, then impacts must be minimized. Mitigation is to be considered only after avoidance and minimization alternatives have been exhausted.

A CWA Section 404 permit is needed for this project. The project development process has complied with the NEPA/404 concurrent process for the Rocky Mountain Area, which is defined in the *Statement of Principle-Wetland Conservation Related to Transportation Projects* (1994).

Wetlands along the existing Guanella Pass Road were identified, sampled, and mapped in accordance with the *U.S. USACE 1987 Wetlands Delineation Manual* and USFWS wetland plant affinity ratings. Sample sites were selected to represent vegetation types observed in the study corridor that may possess wetland characteristics. Fourteen wetland plant community types were identified as potentially disturbed by at least one of the project alternatives. Each of these community types is described in detail in the report *Wetland Survey Technical Memorandum* (MK Centennial, 1997*)*.

Wetlands possess a variety of important functions and values. Specific functions and values of the wetlands to be disturbed are often used for guidance in selecting appropriate wetland mitigation. The Wetland Evaluation Technique (WET) analysis was used to determine wetland functions and values for the principal wetland types that could be affected by roadway

construction. WET evaluates 14 wetland functions and rates each function for its effectiveness. The results of the analysis show that the functions of sediment stabilization and retention, use by wildlife in breeding, and support of wetland-dependent migratory species were the highest-rated categories. Sensitive biological resources associated with wetlands include the boreal toad and the plant communities within the fen at Geneva Park.

The most extensive wetland community type adjacent to the road is the Tall Willow Shrubland. This type of wetland has at least moderate sustained groundwater discharge and at least a moderate effect on floodflow. The dense root structure of the willows provides a high level of sediment stabilization. The output of leaf fall into aquatic systems is important to the productivity of coldwater fisheries of the area. Support for wildlife breeding is high for birds, but moderate for wildlife in general. Although fishermen try to avoid tall willow stands as a matter of convenience, they nonetheless have value as part of the fly-fishing experience.

A fen is a type of wetland which resembles a bog or meadow and supports marsh-like vegetation including sedges and wildflowers. They differ from bogs in that they are primarily fed by groundwater and are not dominated by mosses. Fens are located at high elevations and form at low points in the landscape or near slopes where groundwater intercepts the soil surface, maintaining a constant water level. Soils of fens are formed from the decomposed organic materials of earlier generations of plants and at these elevations, fens may be 10,000 years old or more. Because the rate of soil accumulation is so slow, these ecosystems are considered to be essentially irreplaceable. Mitigation for loss of fens is problematic, as there are no known methods to create new functional fens. Fens provide important benefits for a watershed, including improving water quality and providing habitat for many species. Fens were located within the survey corridor between stations 9+150 to 9+300 and 27+850 to 28+870.

Environmental Consequences

Wetland areas were surveyed in the field, and the data was added to the computer design files to determine potential effects. Alignments were adjusted to avoid impacts where possible, and reduce impacts where they were unavoidable. Field reviews were conducted with the USACE and EPA to determine where design adjustments could be made to avoid or reduce impacts. Adjustments included alignment changes, grade changes, and addition of retaining walls. Additional adjustments during final design may further reduce impacts. Impacts to wetlands are shown in Table III-11 and Figures III-7a through III-7c. The figures show the locations of the larger wetland impacts of each alternative in the roadway corridor. Some of the smaller wetland impacts are not shown on these figures.

All wetlands affected are considered to be jurisdictional, and are regulated by the USACE under Section 404 of the CWA. The permit application will need to show that all practicable measures have been taken to avoid impacts to wetlands.

Impacts to wetlands were determined for each habitat community type. The most abundant wetland type affected by all build alternatives is the Tall Willow Shrubland. This is a montane riparian wetland common to the roadway corridor. In-kind mitigation for impacts would need to focus on providing this type of habitat.

Table III-11
Wetland Impacts by Alternative

Segment		Alternative					
		1	2	3	4	5	6
1+000 to 6+000	Hectares	0.00	0.06	0.06	0.00	0.00	0.00
	Acres	0.00	0.14	0.14	0.00	0.00	0.00
6+000 to 9+000	Hectares	0.00	0.04	0.04	0.04	0.04	0.01
	Acres	0.00	0.09	0.09	0.09	0.09	0.03
9+000 to 14+000	Hectares	0.00	1.68	1.68	0.10	0.10	0.05
	Acres	0.00	4.16	4.16	0.24	0.24	0.12
14+000 to 18+000	Hectares	0.00	0.48	0.48	0.04	0.04	0.03
	Acres	0.00	1.19	1.19	0.09	0.09	0.07
18+000 to 22+000	Hectares	0.00	0.04	0.04	0.04	0.04	0.02
	Acres	0.00	0.11	0.11	0.11	0.11	0.04
22+000 to 24+500	Hectares	0.00	0.16	0.16	0.16	0.16	0.05
	Acres	0.00	0.40	0.40	0.40	0.40	0.13
24+500 to 28+500	Hectares	0.00	0.33	0.33	0.33	0.33	0.12
	Acres	0.00	0.82	0.82	0.82	0.82	0.30
28+500 to 32+000	Hectares	0.00	0.05	0.05	0.05	0.05	0.00
	Acres	0.00	0.12	0.12	0.12	0.12	0.00
32+000 to 36+000	Hectares	0.00	0.04	0.04	0.00	0.00	0.00
	Acres	0.00	0.09	0.09	0.00	0.00	0.00
36+000 to End	Hectares	0.00	0.08	0.08	0.00	0.00	0.00
	Acres	0.00	0.20	0.20	0.00	0.00	0.00
Wetlands	***Total Hectares →***	**0.00**	**2.96**	**2.96**	**0.76**	**0.76**	**0.28**
	Total Acres →	**0.00**	**7.32**	**7.32**	**1.87**	**1.87**	**0.71**
Fens*	***Total Hectares →***	**0.00**	**0.05**	**0.05**	**0.04**	**0.04**	**0.00**
	Total Acres →	**0.00**	**0.09**	**0.09**	**0.09**	**0.09**	**0.00**

* *Fen totals are included in the wetland totals.*

Winter closure of Guanella Pass Road is not expected to impact any wetlands at any of the closure points. Parking areas are in areas already disturbed by former parking areas or where there are no wetland or riparian communities.

Alternative 1 would cause no additional direct impacts to existing wetlands; however, Alternative 1 would impact wetlands through road maintenance activities that cause excess road materials to be deposited into wetlands. Sediment from gravel surfacing and eroding roadway slopes would continue to degrade wetlands.

More detailed analyses of this topic are provided in the *Guanella Pass Road Colorado Forest Highway 80 Wetland Survey Technical Memorandum* (MK Centennial and ESCO Associates, Inc., September 1997) and the *Revised Wetland Survey Technical Report* (MK Centennial, June 2002).

Only Practicable Alternative Finding

This finding relates only to Alternative 6, the Preferred Alternative. If another alternative is selected in the Record of Decision, this finding will need to be revised.

In accordance with Executive Order 11990, it has been determined that there are no practicable alternatives to construction in wetlands. Alternative 1 (No Action) is not considered practicable because it does not address the needs for the proposed project as detailed in EIS Purpose and Need section. Alternatives 2 through 5 each would impact substantially more wetlands than Alternative 6. The proposed roadway design for Alternative 6 has been reviewed for each wetland impact site for the purpose of avoiding impacts to the maximum extent practicable. Where impacts could not be avoided, impacts were minimized to the maximum extent practicable. Reviews included office design reviews and field reviews with the regulatory agencies.

Based on the above considerations, it is determined that there is no practicable alternative to the proposed construction in wetlands and that the proposed action includes all practicable measures to minimize harm to wetlands which may result from such use. Alternative 6 would affect the least amount of wetland area of the build alternatives.

2c. Riparian Communities

Affected Environment

Riparian communities are plant communities adjacent to water that are at least moderately affected by their proximity to water. These areas provide habitat for many species, as well as functions similar to wetlands such as sediment stabilization and toxicant retention. The riparian areas which qualify as wetlands were addressed in the wetland study summarized above. The less well-wetted areas were treated separately. Of the 38.2 kilometers (23.7 miles) of existing roadway, approximately 14 percent is within ten meters of a riparian area.

Environmental Consequences

Winter closure of Guanella Pass Road is not expected to impact any riparian communities at any of the closure points. Parking areas are in areas already disturbed by former parking areas or where there are no wetland or riparian communities.

Alternative 1 would cause no direct impacts to riparian communities; however, it would impact riparian communities through road maintenance activities that cause excess road materials to be deposited into wetlands. Sediment from gravel surfacing and eroding roadway slopes would continue to degrade riparian communities. Alternatives 2 and 3 would impact about 0.98 hectares (2.44 acres), Alternatives 4 and 5 would impact about 0.23 hectares (0.59 acres), and Alternative 6 would impact about 0.13 hectares (0.32 acres) of non-wetland riparian communities.

2d. Other Waters of the U.S.

Affected Environment

The term "other waters of the U.S." refers to waters of the U.S. other than wetlands. Waters of the U.S. in the project area include streams and other water bodies as well as wetlands. Where roadway reconstruction occurs at a stream crossing, there is usually some filling into the stream channel to accommodate the increased width of the new road. A Section 404 permit from the USACE is needed for these fills. The existing road crosses Threemile Creek, Scott Gomer Creek, Duck Creek (4 crossings), Naylor Creek, Leavenworth Creek, and South Clear Creek.

Channel stability affects the ability of streams to support beneficial uses. While it is important that construction not introduce destabilizing influences, it is also important that channels not be confined unnaturally. The intent of channel stabilization is to give the stream sufficient freedom to behave naturally while at the same time protecting roadway slopes from erosion.

Environmental Consequences

Riprap, retaining walls, and other means would be used to stabilize roadway slopes along channels for any build alternative; however, none of the alternatives would reduce any channel cross-sectional areas. Riprap would be placed where the bank is being undermined, not in the existing channel. For riprap and retaining walls, the existing embankment would be excavated and the stabilizing material would be placed in the void. Where the road is close to a channel, any needed road widening would be done away from stream channels. No channels will be made narrower under any of the alternatives.

The only anticipated channel change is where Duck Creek was previously moved 50 meters (160 feet) from its historic channel to accommodate the skewed road near the Alpendorf approach road. The road would be realigned to avoid the northerly two Duck Creek crossings. For any build alternative, the intersection would be squared up at right angles and the stream returned to its historic channel location. The effective length of the channel would remain the same to prevent instability. A permit from the USACE is needed for this work.

3. Visual Quality

Affected Environment

The visual analysis included procedures from FS's Visual Management System and the FHWA's guidelines for visual impact assessments. The visual analysis consisted of examining the view from the road and of the road considering the visual design criteria. The visual design criteria are the elements that make up the visual character of the corridor. The visual design criteria for this analysis included the road visibility, the scenic quality, and the landscape sensitivity. The scenic quality of the area was based on the contrasting landforms, color, and texture of the surrounding landscape. The landscape sensitivity is the capacity of the landscape to accept change. The elements included in the landscape sensitivity were the slope angles, vegetation cover, proximity to water, soil types, solar exposure, the existing scenic quality, and the existing disturbance in the area.

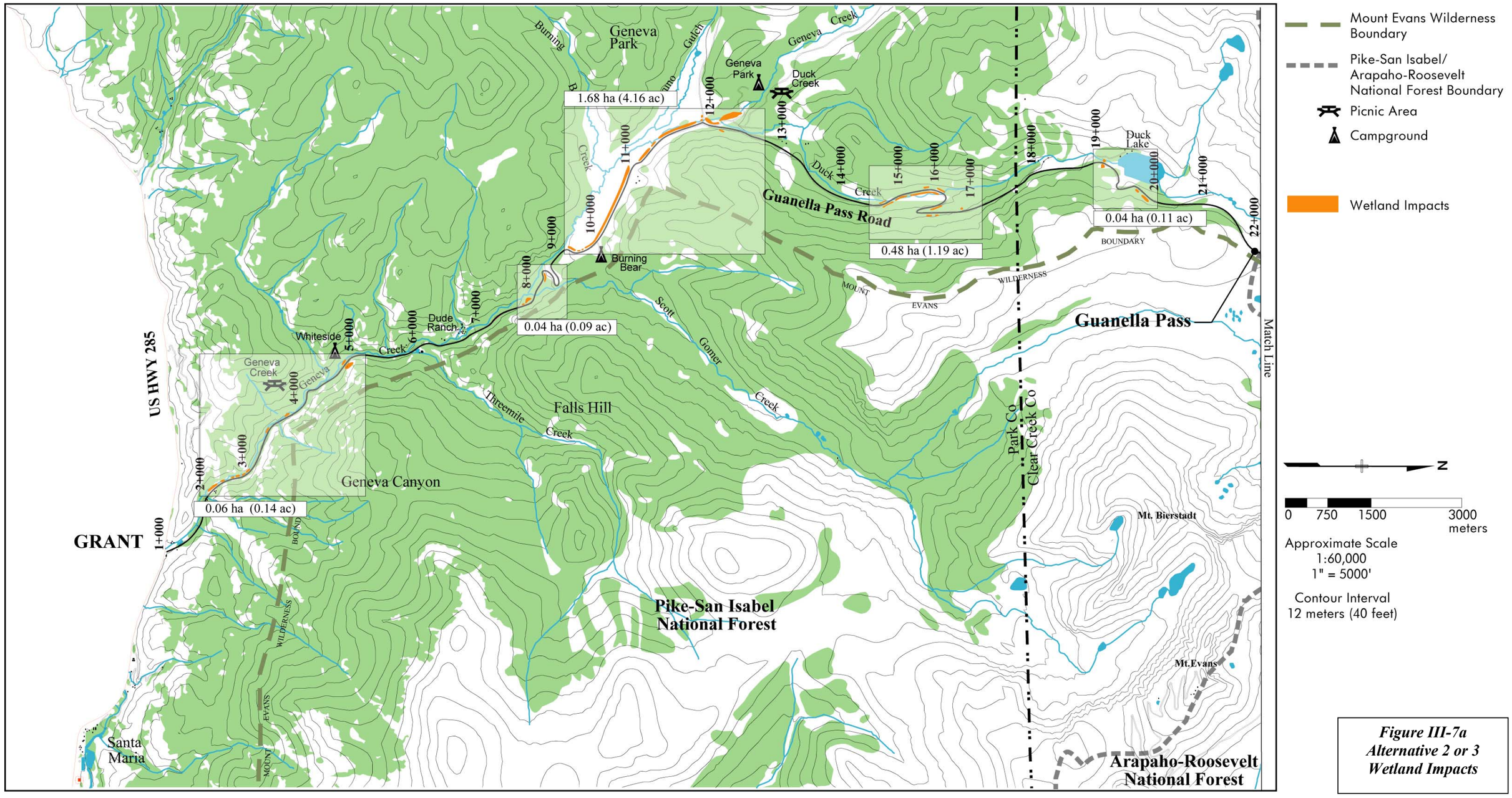


Figure III-7a
Alternative 2 or 3
Wetland Impacts

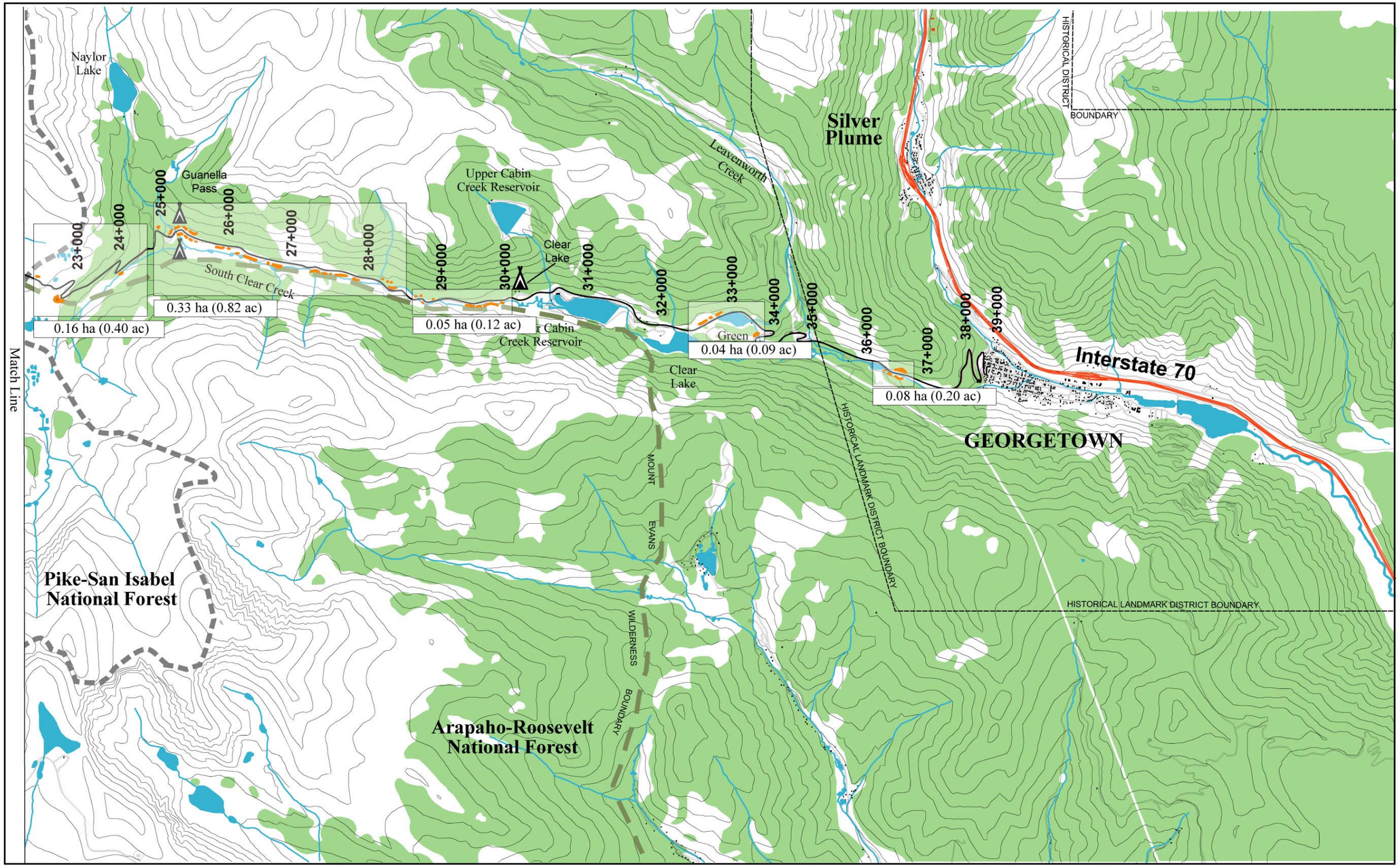


Figure III-7a (cont.)
Alternative 2 or 3
Wetland Impacts

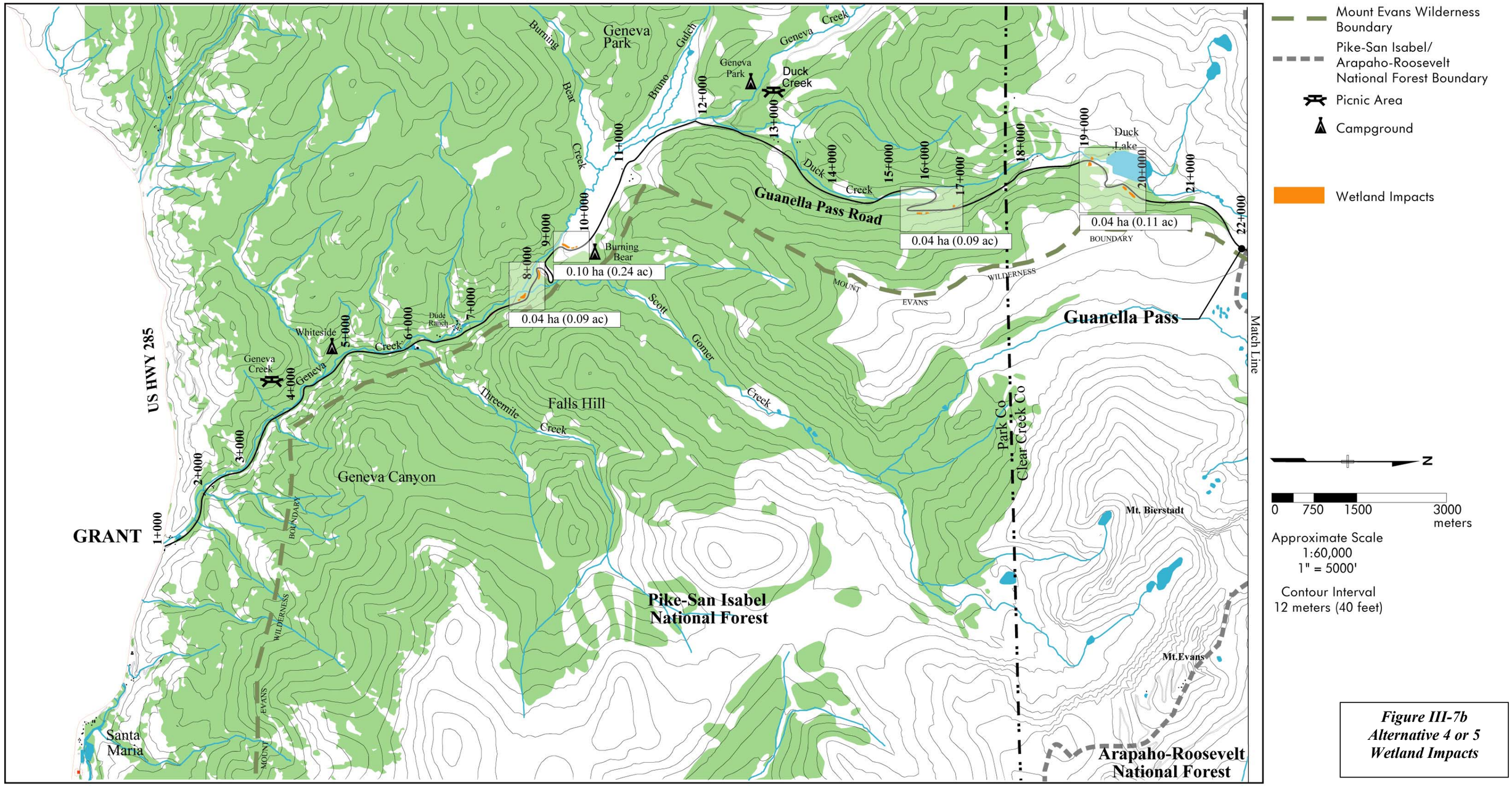


Figure III-7b
Alternative 4 or 5
Wetland Impacts

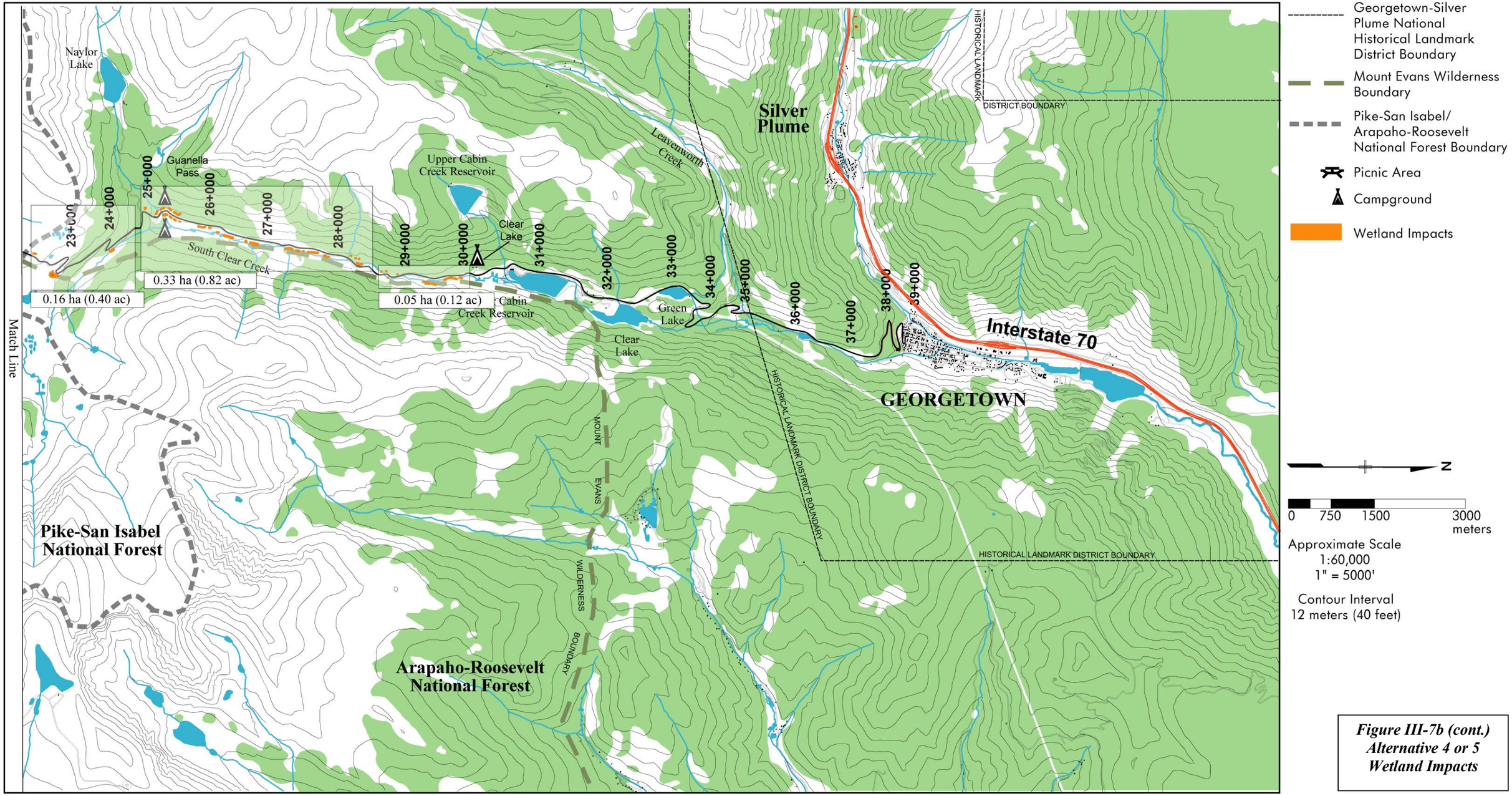
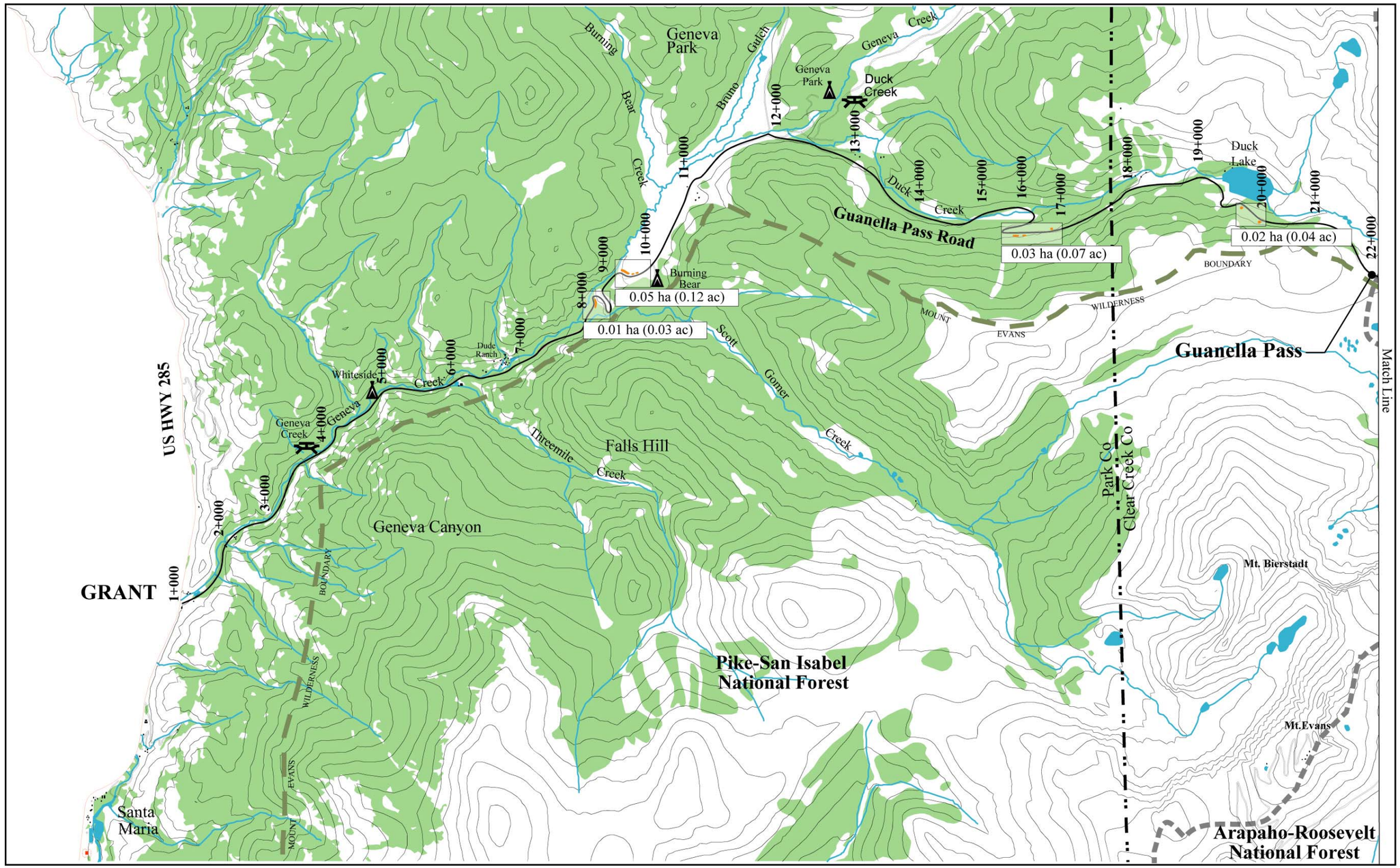


Figure III-7b (cont.)
Alternative 4 or 5
Wetland Impacts



Mount Evans Wilderness Boundary

Pike-San Isabel/ Arapaho-Roosevelt National Forest Boundary

Picnic Area

Campground

Wetland Impacts

N

0 750 1500 3000 meters

Approximate Scale
1:60,000
1" = 5000'

Contour Interval
12 meters (40 feet)

Figure III-7c
Alternative 6
Wetland Impacts

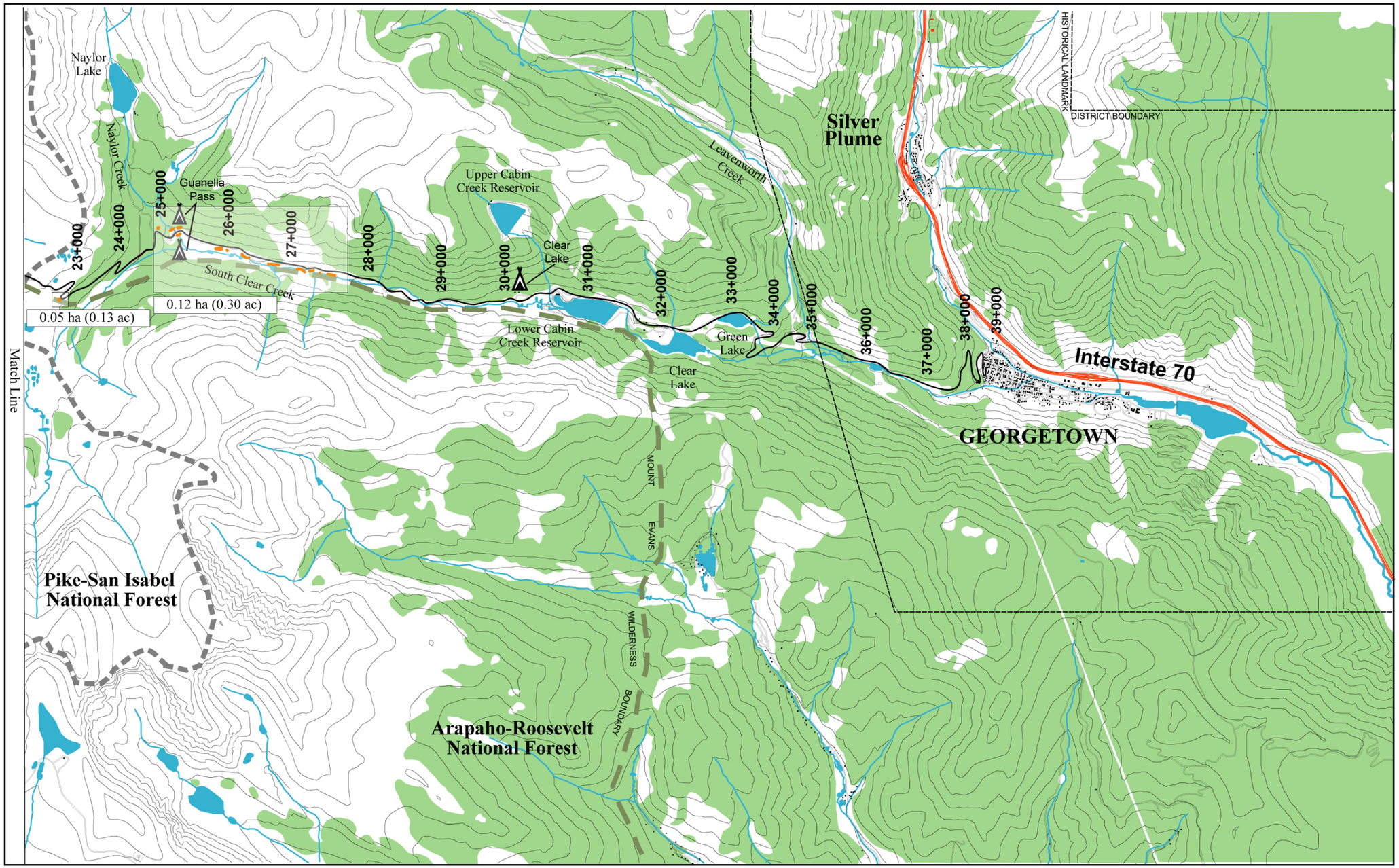


Figure III-7c (cont.)
Alternative 6
Wetland Impacts

The Guanella Pass roadway corridor contains a diverse collection of land forms and vegetation. The visual inventory and assessment for Guanella Pass divided the landscape into 15 distinct character zones. The zones include pasture land, wetlands, lakeside forests, boulder fields, switchbacks, and an industrial area.

The land forms contained within each of the zones vary from open valley in Geneva Park to steep and semi-steep slopes through the switchbacks north of Guanella Pass. The Guanella Pass summit zone is typified by an open tundra landscape with long views of Otter Mountain, Mt. Evans, and Mt. Bierstadt. The switchbacks north of the pass lead to the floor of the valley with numerous large boulders that provide for unique focal points along the road. Steep cuts into the hillside due to construction of the existing roadway create abrupt drop-offs and falling rock hazards while at the same time providing spectacular panoramic views.

The vegetation present in the roadway corridor varies from pasture land for ranches to spruce/fir forests that provide tall overhead canopy. South of the Georgetown switchbacks is an area of wetlands in the Clear Creek drainage. This area is a long, wide valley with numerous beaver dams, ponds, and lodges. The floor of the valley is dominated by wetlands providing a rich habitat for wildlife. At the north end of the pass near Georgetown, tree and shrub growth creeps close to the road edge.

The diverse land forms and land cover through this area create a rustic scene. The spruce/fir forests provide a lush, remote environment. Even the most populated residential developments along the roadway are not noticeable due to the cover of dense vegetation. The numerous rocky cliffs and abundant vegetation throughout certain zones provide views of Rocky Mountain Sheep and other wildlife that are often seen grazing along the roadway. Outside of the forested areas of Guanella Pass Road, the views from the roadway are often long open stretches with distant mountains as the back drop. The presence of strong visual elements within the landscape, including the mountains, rock outcrops, and bodies of water along the pass set the majority of the project corridor in a moderate to high rating for scenic quality.

Environmental Consequences

Several areas of the existing Guanella Pass Road alignment do not meet current safety and design standards. The proposed roadway alternatives are aimed at addressing and correcting these issues while at the same time retaining the visual quality and character of the road. To accomplish this goal, the proposed road alignment (in all build alternatives) deviates slightly from the existing alignment in specific areas. Wherever the existing alignment is abandoned, the original contours of the land form are regraded and revegetated with native plant species to help preserve the visual quality and character of the area. The following discussion characterizes the visual impacts that are common to each of the alternatives.

General Impacts

The parking areas proposed for all build alternatives, listed in **Chapter II.E.1: Parking Areas**, would be constructed to minimize their visual impacts on travelers and would eliminate roadside parking. This would enhance the visual quality of the route. All proposed parking areas meet the VQO's of the FS.

The supplemental aggregate/fill materials required for all build alternatives will come from two materials source sites. The materials source sites are located at Duck Lake (Station 19+200) and the Geneva Basin Ski Area (Station 18+250). These sites are within previously disturbed areas and will be restored according to an FS-approved plan. See **Chapter III.B.6d: Materials Source Locations** for more information on these areas.

Proposed Road Alternatives

The change in visual quality and character of the roadway is dependent on the alternative. Each build alternative affects the visual quality and character of the existing roadway to a different extent. The difference in the visual character is defined by the surface type, the improved and unimproved sections of the road, and the extent of the proposed improvements. Dust suppressants and gravel surface options may also change the appearance of the road. A summary of the effects of each alternative are listed below.

Alternative 1

This alternative requires no new construction. The roadway is left in the existing condition and no new visual consequences are generated. The existing unvegetated, eroding slopes remain. The sense of a backcountry route is retained. However, parking along the roadside will become increasingly worse as the traffic increases.

Alternative 2

Improvements under Alternative 2 include reconstructing and paving the entire length of Guanella Pass Road. Alternative 2 also includes the widening of the existing roadway in certain areas to meet the road design standards discussed in **Chapter II: Alternatives**. Throughout the entire length of the road, the horizontal and vertical alignment will be corrected to improve traveler safety and operational conditions; drainage problems will be addressed and corrected; roadside parking and access will be upgraded and controlled; signs, pavement striping, and guardrail will be upgraded to meet current practice; and existing and new slopes will be stabilized and revegetated.

The roadway corridor will be expanded with the new construction. The ditches will be cleaned out and existing cut slopes will be rolled back to allow for vegetation, where none currently exists. The views of motorists driving on the Alternative 2 roadway will have a greater expanse of pavement in the foreground than currently exists and more open area adjacent to the road, especially in tree lined sections. The character of the existing roadway will lose part of its rustic, backcountry feel because of the change from a gravel road to a paved road and the creation of a 7.2 meter (24 foot) wide road section.

The view of the road from Georgetown will not change dramatically. The road will remain paved on the switchbacks above Georgetown, but it will be widened and retaining walls will be added where necessary to achieve a consistent width of 7.2 meters (24 feet). Roadside slopes will be stabilized and revegetated where needed.

Alternative 3

Improvements under Alternative 3 include reconstructing and resurfacing the entire length of Guanella Pass Road to its existing surface type (gravel or pavement). The portions of the road

that are currently paved will be improved and paved. Alternative 3 also includes the widening of the roadway in certain areas to meet the road design standards described in **Chapter II: Alternatives**. The alignment, safety, drainage, access control, slope stability, and revegetation improvements will be implemented along the entire length of the roadway. Guardrail will be put into place in certain locations.

With the new construction the corridor will be more open. A shoulder will be added that will increase the width of the roadway corridor. Slopes will be rounded and stabilized to support new vegetation. The rustic view of the existing road will be replaced with a more manicured look. The construction will provide a less intimate driving experience, but because of the use of gravel on existing gravel surfaces, it will appear more rustic than Alternative 2.

The view of the road from Georgetown will not change dramatically. The road will remain paved on the switchbacks above Georgetown, but it will be widened and retaining wall will be added where necessary to achieve a consistent width of 7.2 meters (24 feet). Roadside slopes will be stabilized and revegetated where needed.

Alternative 4

Improvements under Alternative 4 include reconstructing and paving four sections of Guanella Pass Road. They include the Falls Hill area, the area along Duck Creek over the summit to Lower Cabin Creek Reservoir, the Green Lake area, and the Georgetown terminus. Currently, the Duck Creek to Lower Cabin Creek Reservoir area is gravel. If Alternative 4 is chosen, this 14 kilometers (8.7 mile) section will be reconstructed and paved. Alternative 4 also includes the widening of the roadway in certain areas to meet the road design standards described in **Chapter II: Alternatives**. Safety, drainage, slope stability, and revegetation improvements will be implemented along the improved portions of the roadway. Guardrail will be put into place in certain locations.

The views of motorists driving on Alternative 4 will have greater expanses of pavement in the foreground in certain areas. Some of the backcountry, rustic character of the roadway will be lost by the additional pavement. In areas of construction, the placement of pavement, a shoulder, and fresh vegetation create a manicured highway look and feel. The remainder of the road will be left entirely unchanged (no safety, drainage, slope stability, environmental, or revegetation improvements) preserving a sense of remoteness. These areas remain winding and rustic.

The view of the road from Georgetown will not change dramatically. The road will remain paved on the switchbacks above Georgetown, but it will be widened and retaining wall will be added where necessary to achieve a consistent width of 7.2 meters (24 feet). Roadside slopes will be stabilized and revegetated where needed.

Alternative 5

Improvements under Alternative 5 include reconstructing and paving four sections of Guanella Pass Road. These are the same four sections identified for improvement under Alternative 4. Widening of the roadway in the improved areas to meet the road design standards described in **Chapter II: Alternatives** is also required. The remainder of the road will be rehabilitated.

The views of motorists driving on Alternative 5 will have greater expanses of pavement in the foreground in all areas that are improved. As in Alternative 4, some of the backcountry, rustic character of the roadway will be lost by the additional pavement, increase in width, and placement of a shoulder. The remainder of the road will be rehabilitated within the existing roadway limits of disturbance, consistent with the existing surface (gravel or pavement). The rehabilitation involves addressing and correcting drainage problems, revegetating any existing or new slopes, and resurfacing the roadway to the existing surface. The sense of remoteness will be replaced with a more open look and feel, but not to the same extent as found in Alternative 3.

Unvegetated or unstable slopes will be revegetated and stabilized. Otherwise, rehabilitation areas remain within the existing platform of the roadway allowing the existing vegetation near the road to remain in place with no disturbance. The character of the roadway is better preserved in the rehabilitation areas, although the roughness of the existing surface will be replaced by a smoother, newly-constructed surface.

The view of the road from Georgetown will not change dramatically. The road will remain paved on the switchbacks above Georgetown, but it will be widened and retaining wall will be added where necessary to achieve a consistent width of 7.2 meters (24 feet). Roadside slopes will be stabilized and revegetated where needed.

Alternative 6

In contrast to Alternatives 2-5, Alternative 6 assumes a rural local road classification and uses the following design elements to help reduce the visual impact the proposed alignment has on the environment. These design elements are:

- Reduced design vehicle size
- Reduced curve radius (due to a smaller design vehicle), allowing the road to more closely follow the existing road
- Maximized rehabilitation opportunities and minimized reconstruction

As a result, the visual impacts related to the minor road realignments are less pronounced for Alternative 6 than for the other build alternatives. The minimum design vehicle standard allows a sharper switchback design curvature that allows the road alignment to more closely follow the existing road. Combined with the minimum roadway width, these two design elements help reduce the amount of retaining wall needed in the switchbacks near the Town of Georgetown. The minimum roadway width also helps preserve more of the roadway character than Alternatives 2-5.

Alternative 6 will change the existing views for motorists on the road. The changes occur mostly in the full reconstruction areas (19 percent of the route) where the road is opened up, the roadway platform (roadway plus adjacent ditches and foreslopes) is widened, and the cut and fill slopes are reconstructed and extended to promote slope stabilization and revegetation. The reconstruction areas provide a less rustic and intimate appearance than the existing setting. Nevertheless, Alternative 6 would have less impact to the visual setting than Alternatives 2-5 given that Alternatives 2-5 have a wider roadway and more reconstruction activity than Alternative 6 (see Table III-42).

Unvegetated or unstable slopes will be revegetated and stabilized. Otherwise, rehabilitation areas remain within the existing platform of the roadway allowing the existing vegetation near the road to remain in place with no disturbance. The character of the roadway is better preserved in the rehabilitation areas, although the roughness of the existing surface will be replaced by a smoother, newly-constructed surface. However, in areas of macadam surfacing, the road will have a more rustic appearance than in the asphalt with chipseal areas.

The view of the road from Georgetown will change less than for Alternatives 2-5. The switchbacks above Georgetown will undergo rehabilitation or light reconstruction, and will remain paved. The road will maintain a consistent width of 6.6 meters (22 feet) and, as mentioned above, unvegetated or unstable slopes will be revegetated and stabilized.

Realignment Impacts

Generally, the proposed road under all alternatives matches the existing road alignment, with three exceptions (presented in Figures III-8 and III-9).

Station 18+900 to 19+200, Including the Duck Lake Access Road

At this location, the proposed alignment for all build alternatives shifts to the east of the existing road requiring the new alignment to cut through a dense stand of fir trees. This is being proposed to reduce impacts to Duck Creek and to provide a safer entry to the Duck Lake residences. The old alignment will be revegetated with native plant species to repair the existing road scar. Given the proximity to the creek, revegetation should be successful. Although adequate revegetation will take years, the view of the existing alignment is hidden from the view of the motorist. The proposed route changes the existing creek side view to a tree-lined vista for the motorist. The roadway will have new vegetation and shoulders, giving the road a more open look and feel.

The Duck Lake Switchback Between Stations 19+447 and 19+622

The proposed alignment for all build alternatives bypasses the existing switchback by cutting through a stand of firs. The bypass will require large quantities of fill material to recontour the old, over-steepened cut slope located at the approach to the switchback. The proposed alignment provides the motorist with a tree-lined vista. The wooded area provides a more intimate setting than the steep drop off. The roadway will have new vegetation and a shoulder giving the road a more open look and feel.

The Lower Guanella Pass Switchbacks Between Stations 24+500 and 25+235

At this location, the proposed switchbacks for all build alternatives make extensive cuts into dense fir stands, tripling the existing area opened by forest cuts. The larger radius used at Stations 25+112 to 25+198 will be quite visible from the Guanella Pass Campground. The existing alignment will be revegetated with native plant species to repair the road scar. The view for the motorist will be more of a forest-lined route, enhancing the remote character of the roadway. The roadway will have new vegetation and a shoulder giving the road a more open look and feel.

Character of the Road

Alternative 6 was developed with the intention of retaining the visual quality and character of the road while balancing other needs. The character of the road is defined by many elements. The Town of Georgetown, Clear Creek County, and Park County have developed a list of elements that characterize the rural look and feel of Guanella Pass Road. These elements are listed in Table III-12, along with a summary of the status of each element under each of the alternatives. These elements will be considered during final design in coordination with the Town of Georgetown, Clear Creek County, Park County, and other interested parties.

The proposed road alignment for all build alternatives deviates slightly from the existing alignment in specific reconstruction areas. Wherever the existing alignment is abandoned, the existing roadway is regraded to conform to the original contours of the terrain, and revegetated with native plant species to help restore the visual quality and character of the area.

Additionally, the use of hardened surfacing options other than asphalt for any of the build alternatives will help preserve the character of the road and allow vegetation to grow closer to the road than a gravel surface. The surfacing options (see **Chapter II.B.6a: Surfacing Options**) provide a functional and aesthetic option to paved or gravel road sections. The chip seal on pavement option for asphalt-paved surfaces looks and feels more like a gravel road. The gravel alternative surface options add strength to the road without actually paving it with asphalt. The character of the road is better maintained with gravel alternative surfacing options than with an asphalt pavement, and the structural integrity of the road is better maintained than with just a gravel surface. The gravel alternative surfacing options vary in their ability to provide a stable surface. Surfacing options like magnesium chloride, PennzSuppress D, Permazyme, and Road Oyl are better than an untreated surface, but do not provide the same roadside erosion and sedimentation protection as a more solid surface like macadam or asphalt pavement. In addition to decreasing sedimentation and erosion, the hardened surface types also dramatically reduce the amount of dust produced by traffic on the roadway. This improves the visual quality of the road.

Several options for retaining walls, slope treatments, and guardrail design and materials are being considered to create a design that is aesthetically pleasing and keeps with the character of the road (see **Chapter II.G.1: Retaining Wall Design and Slope Treatments** and **Chapter II.G.3: Guardrail Design and Materials** for more detail on these options).

Selected Existing Photos and Computer Simulations

As part of the public involvement process, several photo simulations were prepared for the Preferred Alternative (Alternative 6) that show the existing conditions and proposed roadway improvements at several locations along the corridor. These simulations include a macadam surface at the Geneva Creek Picnic Area (Figure III-10), the "Golden Cathedral" area north of Grant (Figure III-11), a macadam surface at the second switchback north of Guanella Pass (Figure III-12), a paved surface near Georgetown Reservoir (Figure III-13), a paved surface at the third switchback above Georgetown (Figure III-14), and a paved surface at the second switchback above Georgetown (Figure III-15).

Visual simulations of a road section paved with chip seal, as well as a switchback using a MSE retaining wall, were also prepared to show what these elements of the road improvement project will look like if approved for construction. These simulations are presented in Figures III-16 and III-17.

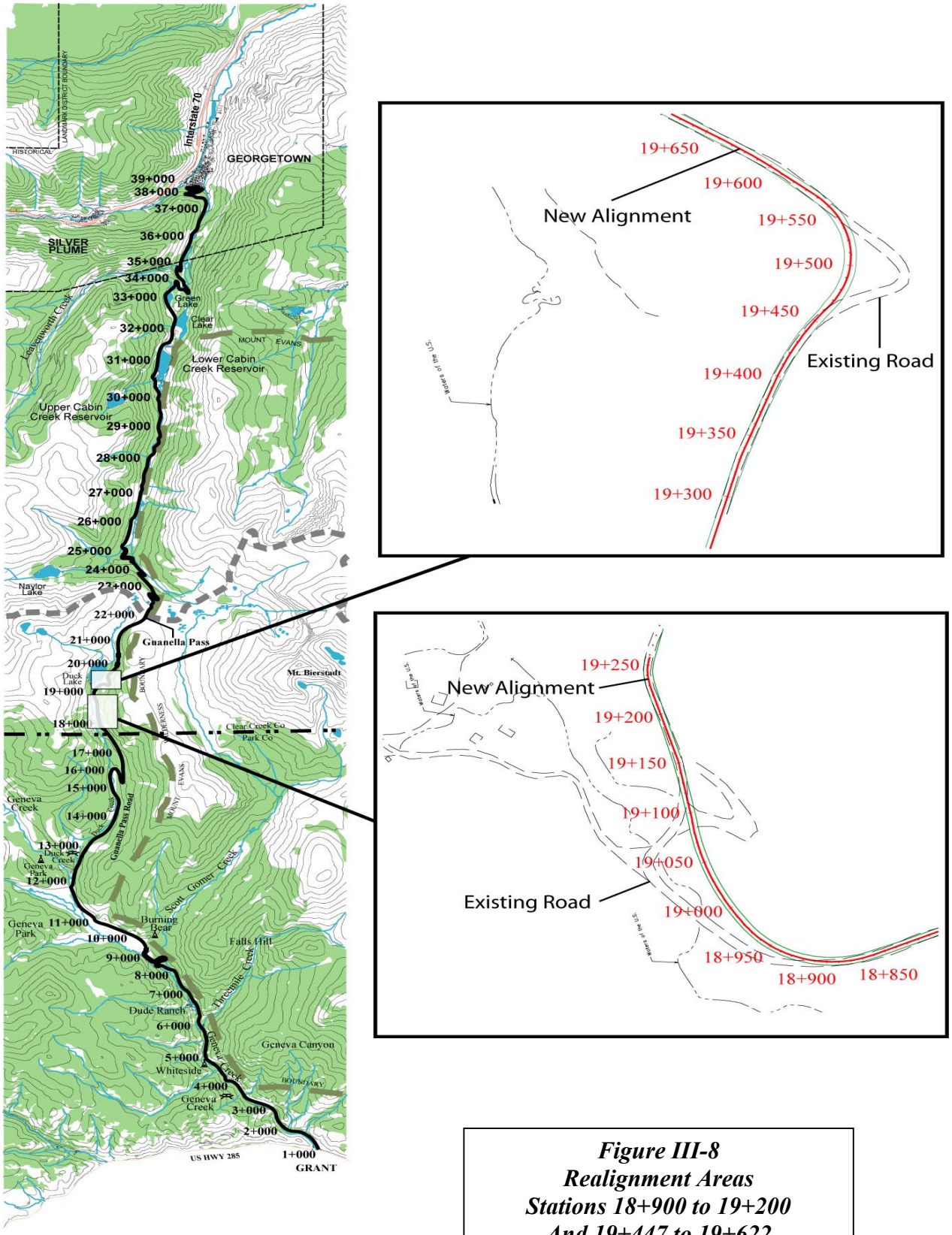


Figure III-8
Realignment Areas
Stations 18+900 to 19+200
And 19+447 to 19+622

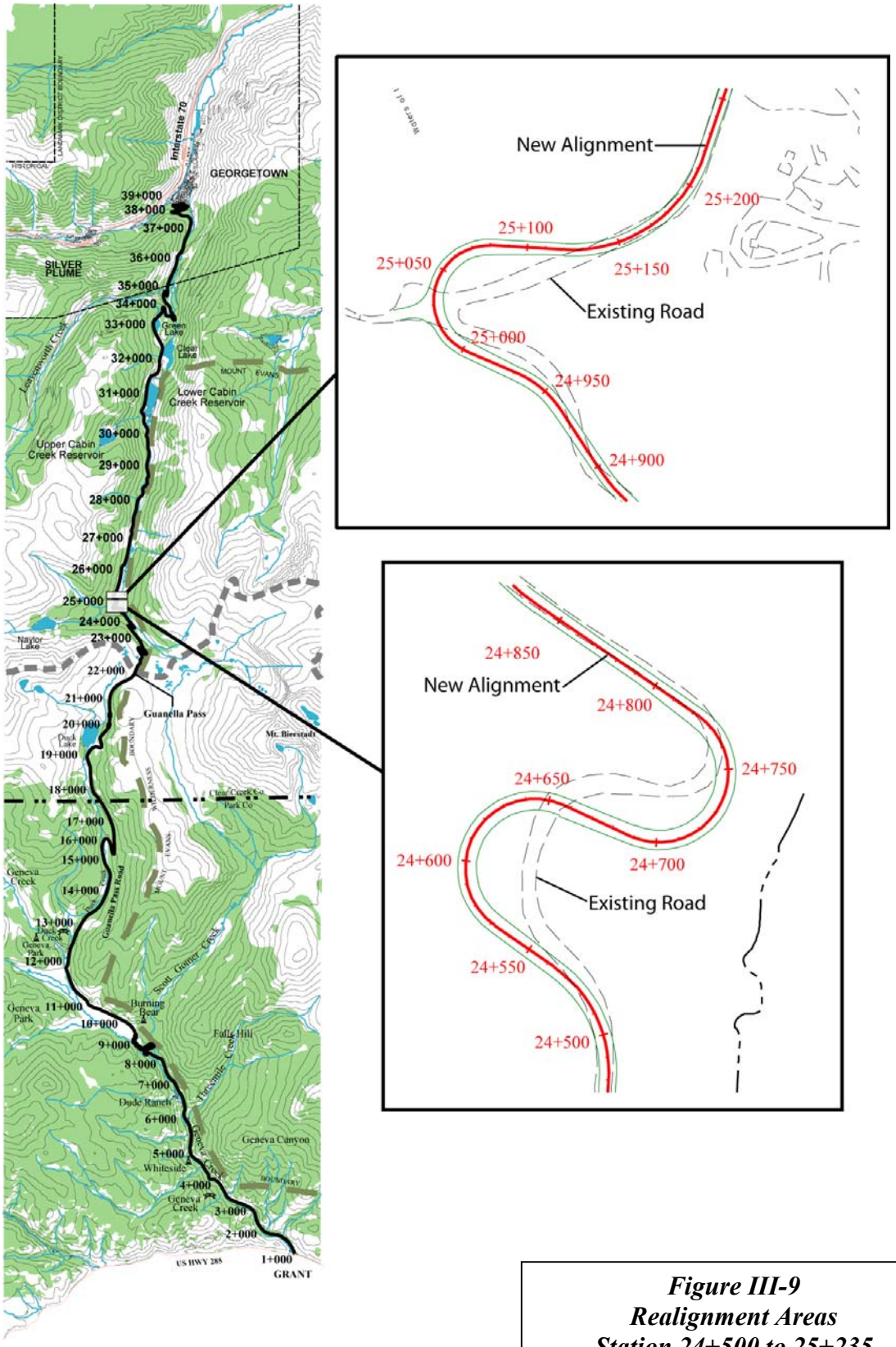


Figure III-9
Realignment Areas
Station 24+500 to 25+235

Table III-12
Road Character Elements

Elements	Alternative 1 (No Action)	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Roadway width	5.5 – 7.2 meters (18 – 24 feet)	7.2 meters (24 feet)				6.6 meters (22 feet)
Platform width	Variable	9.1 – 11.0 meters (30 – 36 feet)				7.8 – 9.8 meters (26 – 32 feet)
Road surfacing	Deteriorated pavement (48%) and dirt/gravel (52%) surfaces.	New pavement (100%) surface.	New pavement (48%) and gravel (52%) surfaces.	New (50%) and deteriorated (36%) pavement surfaces; deteriorated dirt/gravel (14%) surface.	New and rehabilitated pavement (86%) and gravel (14%) surfaces.	New and rehabilitated pavement (56%), gravel alternative (30%) and gravel (14%) surfaces.
Design Function/Use	N/A	Rural collector				Rural local road
Cut Walls (% of route)	0%	3%	3%	1%	1%	2%
Fill walls (% of route)	<1%	26%	26%	20%	20%	14%
Guardrail/Guardwall (% of route)*	5%	38%	38%	26%	26%	23%
Striping	Currently Unstriped	100%	48%	48%	85%	56%
Design Vehicle Size (Wheelbase)	N/A	6.1 meters (20 feet)				5.2 meters (17.1 feet)
Design Speed	N/A	40 – 60 km/h (25 – 40 mph)				30 – 50 km/h (20 –30 mph)
Vegetation Cover Adjacent to the Road	A hardened surface (pavement or gravel alternative) decreases road erosion and sedimentation and facilitates the establishment of roadside vegetation. The ability to provide a stable environment for vegetation is determined by the amount of hardened surface in the alternative – see Road Surfacing row (above).					
Slope Revegetation and Drainage	No slope treatments	The amount of slope treatment and drainage work is related to the level of construction for the alternative. The greatest amount of slope treatment and drainage work occurs in full reconstruction (FR), followed by light reconstruction (LR), rehabilitation (REHAB), and no action (NA).				
		100% FR 0% LR 0% REHAB 0% NA		51% FR 0% LR 0% REHAB 49% NA	51% FR 0% LR 49% REHAB 0% NA	19% FR 18% LR 63% REHAB 0% NA
Alignment	No change in alignment	Alignment is related to the design speed (see Design Speed, above). The higher design speed of Alternatives 2-5 means flatter horizontal and vertical curves than existing alignment.				The lower design speed of Alternative 6 means the alignment more closely matches the existing alignment.

** Includes guardrail used in MSE wall sections and guardwall used in the Georgetown area.*

B E F O R E

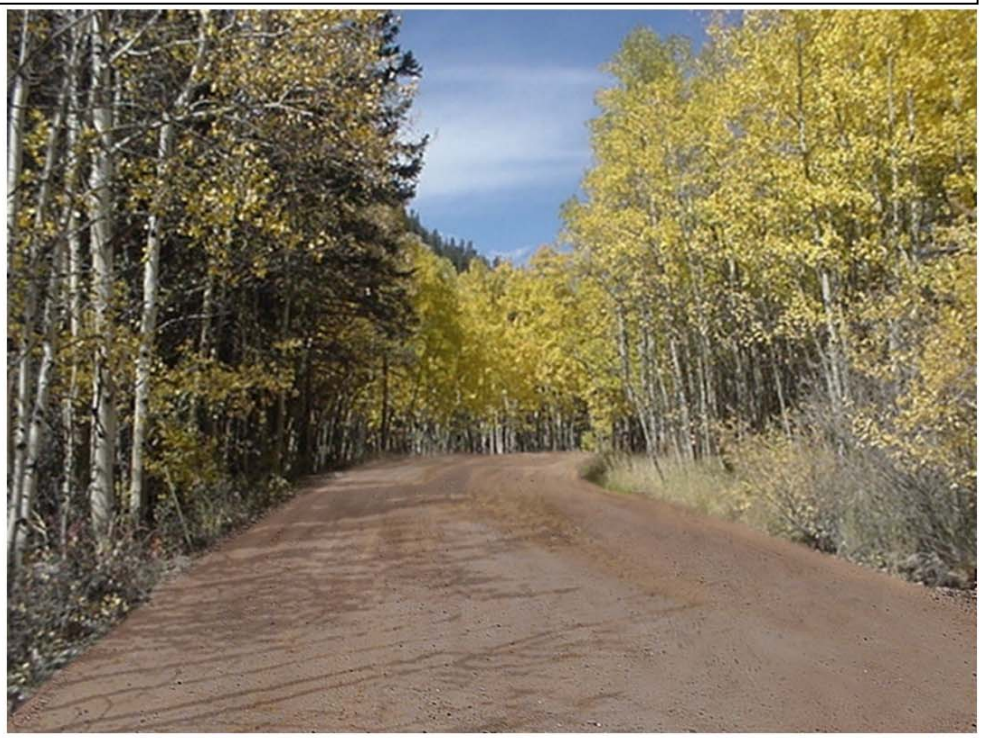
Figure III-10
Station 3+900 Rehabilitation, Macadam Surface
Geneva Creek Picnic Area

A F T E R

BEFORE

Figure III-11
Station 5+900 Rehabilitation, Gravel Surface
Golden Cathedral Area

AFTER



B E F O R E

Figure III-12
Station 22+900 Light Reconstruction, Macadam Surface
Second Switchback North of Guanella Pass Summit

A F T E R

BEFORE

Figure III-13
Station 36+200 Rehabilitation, Paved Surface
Georgetown Reservoir Area

AFTER

BEFORE

Figure III-14
Station 38+320 Rehabilitation and Light Reconstruction, Paved Surface
Third Switchback Above Georgetown

AFTER

BEFORE

Figure III-15
Station 38+740 Rehabilitation, Paved Surface
Second Switchback Above Georgetown

AFTER

B E F O R E

Figure III-16
Station 37+700 Chip Seal Surface

A F T E R

BEFORE

Figure III-17
Station 16+500 Full Reconstruction, Paved Surface, MSE Retaining Wall
Shelf Road

AFTER

4. Recreational Resources

Guanella Pass Road provides access to many recreational resources. Recreation activities enjoyed along the route include hiking, mountain biking, fishing, camping, picnicking, sightseeing, aspen viewing, wildlife viewing, driving for pleasure, and many others.

The majority of Guanella Pass Road passes through NF lands. Of its total 38.2 kilometers (23.7 miles), approximately 21.1 kilometers (13.1 miles) pass through the Pike NF on the southern portions of the road and 12.4 kilometers (7.7 miles) pass through the Arapaho NF on the northern portions of the road. This area offers access to Mt. Bierstadt and the Mt. Evans Wilderness. A breakdown of the major trip purposes for travelers on Guanella Pass Road, based on roadside surveys taken during the summer and peak aspen viewing seasons in 1994, is given in Figure III-18.

Many recreational opportunities within the NFs are supported by Guanella Pass Road. The Pike NF, Arapaho NF, and Mt. Evans Wilderness include 444,039 hectares (1,110,097 acres), 408,275 hectares (1,020,687 acres), and 29,760 hectares (74,401 acres), respectively. Changes to the road that increase traffic levels will most likely increase the level of usage for each of these areas.

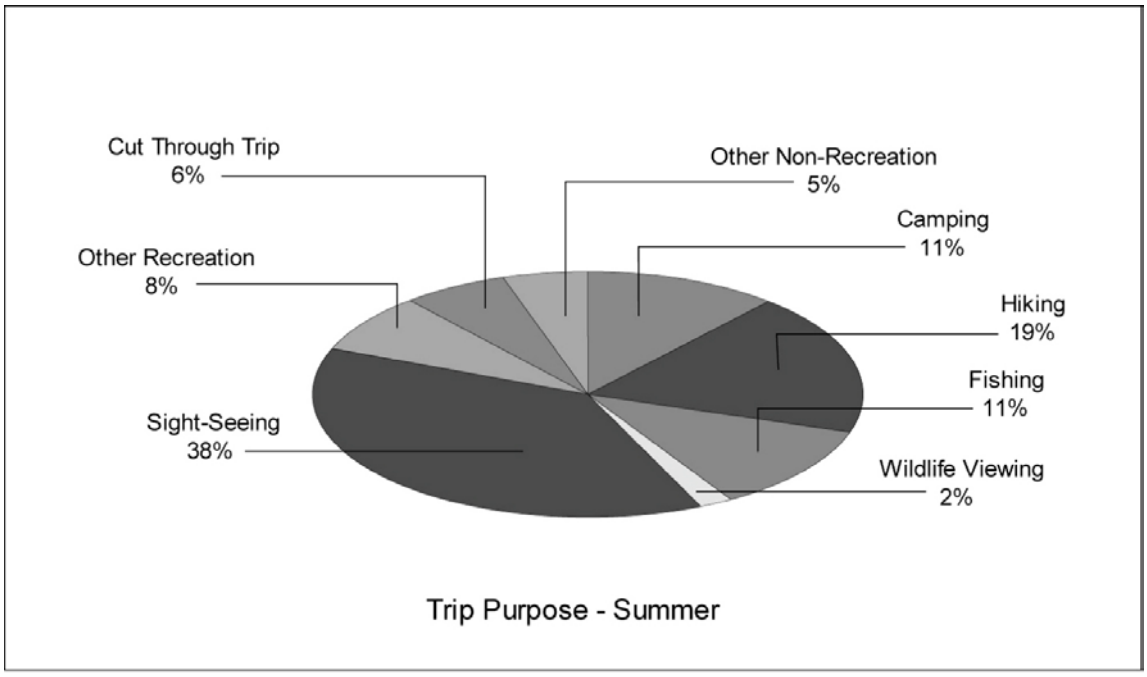
4a. Recreational Activities

Affected Environment

Developed recreational sites within the NF lands include campgrounds, picnic areas, and trailheads with parking. Table III-13 lists the developed recreational sites.

Table III-13
Developed Recreational Sites Within the Project Area

Recreation	Number of Sites/Parking Sites
Campgrounds	
Clear Lake	8
Guanella Pass	18
Geneva Park	26
Burning Bear	13
Whiteside	7
Picnic Areas	
Clear Lake	4
Duck Creek	5
Geneva Creek	5
Trailheads with Parking	
Silver Dollar Lake	8
Guanella Pass	50
Abyss Lake	30
Threemile Creek	5
Source: Guanella Pass Road Colorado Forest Highway 80 Recreation Resource Technical Memorandum, March 1997.	



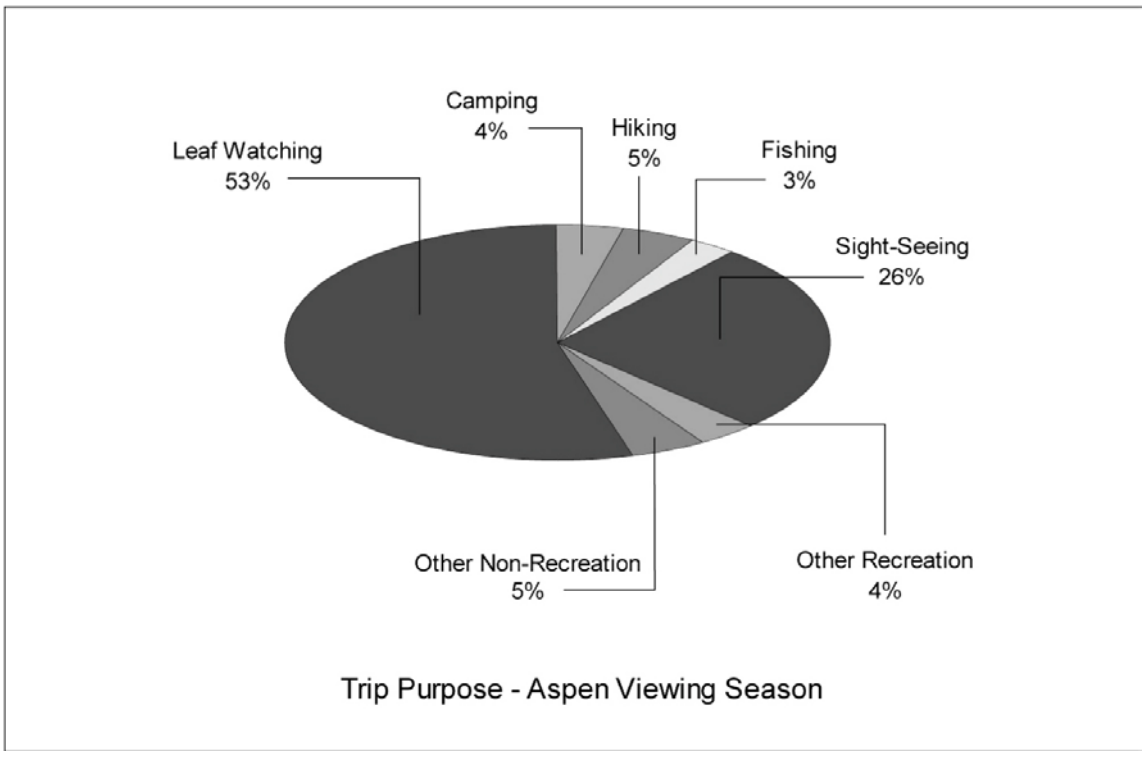


Figure III-18
Trip Purpose During Summer and Peak Aspen-Viewing Seasons, 1994

The following hiking trails are accessed from Guanella Pass Road:

Silver Dollar Lake Trail
Square Top Lake
Shelf Lakes
Waldorf Townsite
Rosalie Trail
Guanella Pass Trail
Abyss Lake Trail
Burning Bear Trail
South Park Trail
Threemile Creek Trail
Scott Gomer Trail

In addition to these trails, several historic wagon roads and burro trails exist in the area. These include the Notch Trail, which connects Georgetown and Silver Plume, the railroad grade of the old Argentine Central Railroad, the Georgetown – Snake River Wagon Road, and the old road to the Geneva City Townsite.

The Continental Divide National Scenic Trail (which is currently in the implementation stage) is located in the general area. The trail corridor is approximately 4,800 kilometers (3,000 miles) in length and follows the Continental Divide throughout the country from Mexico to Canada. The trail corridor is approximately 10 kilometers (6 miles) west of Guanella Pass. The American Discovery Trail corridor (in the planning stage) will cross near Guanella Pass. This trail corridor will connect California and Maryland. If both of these projects are constructed, then Guanella Pass will be near the intersecting point for the nation's only complete east/west and north/south trail system.

The Guanella Pass area is also popular for fishing. Abyss Lake, Frozen Lake, Square Top Lakes, Geneva Creek, South Clear Creek, Bruno Gulch, Clear Lake, Georgetown Reservoir, Murray Lake, and Silver Dollar Lake provide fishing opportunities. Murray Lake and Silver Dollar Lake are accessed by trails off Guanella Pass Road. Geneva Creek, South Clear Creek, Bruno Gulch, and Clear Lake are accessed by Guanella Pass Road. Abyss Lake and Frozen Lake are located in the Mt. Evans Wilderness Area, and are accessed from the Abyss Trailhead. The Square Top Lakes are approximately 1.24 kilometers (2 miles) from Guanella Pass. The Georgetown Reservoir is located in Georgetown.

Abyss, Frozen, Square Top, Murray, and Silver Dollar Lakes all have cutthroat trout (sub-species unknown). Each of these lakes are above 3,600 meters (12,000 feet) and are often ice-covered until mid-June. Stream fishing opportunities exist along Geneva Creek. Additionally, many pullouts allow easy fishing access for rainbow trout and brook trout along the south fork of Clear Creek. Geneva Creek, from the confluence with Scott Gomer Creek upstream to the headwaters, does not support a fishery because of acid mine drainage (AMD) pollution and the natural leaching of heavy metals from the soil.

In addition to the developed recreational sites, the forests are used for dispersed recreational activities (activities in areas not developed for use). Dispersed use activities include hiking, fishing, camping, cross-country skiing, hunting, horseback riding, four-wheel driving, and snowshoeing.

The FS has a variety of types of information available to show recreation use in the NFs within the project area. These include recreation information management data for the region and for specific sites such as campgrounds and picnic grounds, trail registration sheets which provide counts of trail users, and counts of vehicles in parking lots. The FS Recreation Information Management (RIM) database provides 1994 recreational use data for the Pike NF. RIM data,

while not based on a scientific sampling, is the only information available on recreational use in the area. The RIM data is not available for these activities in the Arapaho NF. The data available for areas along Guanella Pass Road in the Pike NF are shown in Table III-14.

The RIM database contains data for the campgrounds in both the Pike NF and Arapaho NF. The data shows recreational use by recreation visitor days (RVD). Each RVD assumes a recreational use of 12 hours. During the period of May 1 through September 1, 1994, the developed campgrounds and picnic areas provided 73,440 RVD's. This level of use is nearing the capacity of the facilities.

Trail use data are available from the trail registers located at the trailheads for most of the major trails within the study area. The registers ask the trail user for information including the number in their party, their hiking destination, and what other activities they are doing along the hike. This data illustrates the high levels of trail use in the Guanella Pass Road area. The highest levels of use are on the Guanella Pass trail. The peak weekend day on this trail was recorded (by numbers of trail users who registered at the trailhead) on Saturday, August 16, 1995 as 334 people. This trailhead is particularly popular because it allows access to Mt. Bierstadt which, at 4,285 meters (14,060 feet), is one of Colorado's 54 official "fourteeners[4]".

Environmental Consequences

Recreational use of the NFs in the project area has been steadily increasing and is expected to continue to increase in the upcoming years. The Guanella Pass area is within a one to two hour drive of the Front Range, which has one of the fastest growing populations in the nation. Colorado is second in the nation for total visitor days in use of NFs for recreation and fifth for total visitor days camping in NFs. In some parts of Colorado, recreation demand is growing twice as fast as population.

The growth of recreational demand in the Guanella Pass study area is related to several factors, including:

- The proximity of the Front Range to the project area.
- Easy direct access via Interstate 70 or U.S. Highway 285.
- Increases in recreational trips per capita.
- The presence of the Mt. Evans Wilderness Area.
- The presence of Mt. Bierstadt and Mt. Evans.

[4] Mountains that have an elevation of at least 4,267 meters (14,000 feet) above Mean Sea Level (MSL).

Table III-14
1994 Recreational Activities Along Guanella Pass Road Within Pike NF
*(Recreation Visitor Days *)*

	Recreation from Roads	Recreation from Trails	Recreation on Lakes & Streams	Dispersed Recreation	Total
Sight Seeing	187	289			476
Auto Drive	12,905				12,905
Nature Study				534	534
Motorcycle	2,368				2,368
Ice/Snow	810			2,130	2,940
Hiking	810	17,627		4,831	23,268
Bicycle	561	838			1,399
Horse	498	3,237		2,072	5,807
Cross-Country Ski	562	2,109		1,356	4,027
Snow Play				1,345	1,345
Fish			7,060		7,060
Swim/Play			510		510
Camp – Gen				6,222	6,222
Camp – Auto				3,560	3,560
Camp – Trailer				580	580
Camp – Tent				6,030	6,030
Picnic				3,137	3,137
Hunt – Big Game				1,386	1,386
Nature Collection				310	310
Total	18,701	24,100	7,570	33,493	83,864

Source: Guanella Pass Road Colorado Forest Highway 80 Recreation Resource Technical Memorandum, March 1997.
** A Recreation Visitor Day is twelve hours of use of the forest for the specified activity, whether that use is by one person or the sum of a number of people.*

Table III-15
Trail Use in the Guanella Pass Road Area, Summer 1995 (# of trail users)

Month	Threemile	Abyss Lake	Rosalie	Bierstadt
June 95	142	478	N/A	N/A
July 95	310	1,130	890	400 (July 29 – 31)
Aug. 95	384	700	1,264	2,394

Source: Guanella Pass Road Colorado Forest Highway 80 Recreation Resource Technical Memorandum, March 1997.
N/A: Not Available

The FS estimated that demand for camping in the Arapaho NF will increase approximately 45 percent from 1993 to 2005. The projected increase in dispersed recreational use over the same time period is approximately 79 percent. The activities that currently have the highest amounts of dispersed use are camping, hiking, and fishing. Camping and mountain biking in the Arapaho NF are projected to increase 118 percent and 205 percent, respectively, from 1993 to 2005. No recreational demand projections have been developed by the FS for the Pike NF.

One of the most common uses of forest lands is recreational driving. Sightseers driving Scenic and Historic Byways generally prefer improved roads with good driving surfaces. Other recreational users may not be as concerned about the road surface.

An improved road provides easier access to many of the recreational sites along Guanella Pass Road and to many areas used for dispersed recreation. Concentrated use of recreational areas has a variety of impacts including soil compaction and soil erosion, displacement of wildlife, and trampling of vegetation. Access from the road has led to the development of many social (unofficial) trails off the road that traverse delicate willow and tundra plant communities. However, the use of guardrail, pullouts, and defined parking areas will help to control the amount of recreational use in non-designated areas.

Although many areas of the forest have available capacity for increased recreational use, some of the most popular areas in the forest, such as hiking trails to the "fourteeners", are currently at or exceeding the FS recommended recreation carrying capacity. Increased access and use of the area by recreationists create an additional strain on the carrying capacity of the area along these trails.

Increased access and use by recreationists also create more pressure for dispersed use of the forests. Dispersed recreational use, such as fishing and camping in undeveloped campsites and off-trail hiking, impacts the forests. Increased dispersed use results in more environmental impacts and greater challenges to the FS in managing the appropriate levels of, and areas for, dispersed use. Design features will be incorporated into the improved roadway to limit the amount of dispersed recreational use. These features include guardrail placement, pullout locations, and the placement of large boulders to block vehicular access to certain areas.

An increase in recreational users in the area has a detrimental impact on the recreational experience for some users. Many forest users try to escape from people and congestion by going to the mountains. Serenity, quiet, and other tranquil characteristics are decreased in heavy recreational use areas.

Residents in the project area have expressed concern about increased use by off-road vehicles that damage delicate ecosystems along Guanella Pass Road. Design elements that will help control off-road use include strategic placement of guardrail, pullout locations, and large boulders to block vehicular access. Although the FS management strategy currently addresses these uses in the forest, improving the road may cause an increased need for patrols.

For this analysis, increases in recreational activities are assumed to be directly proportional to the increase in traffic volume. However, the FS has indicated to the FHWA that it will not simply build parking to meet demand. Instead, the agency will limit parking to a level that is based on the physical and social carrying capacities of the area.

Alternative 1

Traffic levels for Alternative 1 are estimated to be 56 percent greater than 1995 traffic levels by 2025. The demand for recreational use of the Guanella Pass area is expected to increase according to this increase in traffic.

Alternatives 2-6

Alternatives 2-6 are all expected to create traffic volume increases in excess of the Alternative 1 (No Action) increase. As such, the demand for recreational use of the Guanella Pass area is expected to increase proportional to the traffic increases. Alternatives 2,4, and 5 will create the greatest recreational demand (40-80 percent over No Action), followed by Alternative 3 (35 percent over No Action), and Alternative 6 (20 percent over No Action).

For additional information on existing and projected traffic volumes on Guanella Pass Road see **Chapter III.B.1b: Traffic Volumes**. Currently, approximately 90 percent of road usage is for recreational trips. It is expected that this recreation use rate will continue if the road is improved and the increased traffic volume will result in increased recreational use.

All Alternatives

Traffic noise levels are expected to increase for every alternative (including Alternative 1) in proportion to the amount of traffic growth. Traffic noise can affect the recreation experience by detracting from the feeling of isolation. In the Mount Evans Wilderness area, it is expected that serenity and quiet are important to the preservation of the recreation experience. Noise is not expected to exceed levels that would diminish the recreation experience. Traffic noise levels for all alternatives are not expected to have any substantial impact on any recreational facilities in the corridor. The recreation experience will be slightly affected as a result of the increase in traffic noise, although the effects of the noise will be limited to the immediate vicinity of the road. Additional discussion of noise impacts is included in **Chapter III.C.2: Noise**.

More detailed information on recreational resource impacts is in the *Guanella Pass Road Colorado Forest Highway 80 Recreation Resource Technical Memorandum* (MK Centennial and Hermsen Consultants, March 1997).

4b. Parking

Affected Environment

Parking surveys were conducted to obtain information on current parking demand along Guanella Pass Road. Current parking demand exceeds supply at the Guanella Pass summit parking area, Clear Lake parking area and other areas along the corridor resulting in vehicles parking along the road. Figure III-19 displays the locations of existing and proposed parking areas along the corridor.

Environmental Consequences

The proposed improvements included in all of the build alternatives are listed below:

- Geneva Creek Picnic Ground (station 4+000) – The existing five-vehicle parking area will be retained but decreased in size to three vehicles. Portions of the existing parking area will be reclaimed.
- Grant Byway Entrance (station 4+100 to 4+150) – This new parking area will provide parking for approximately 15 vehicles.

- Whiteside Campground (station 4+820 to 4+870) – The existing parking area (10 vehicles) will be retained.

- Threemile Creek Trailhead (station 5+500 to 5+550) – This existing parking area (four vehicles) will be retained.

- Burning Bear/Abyss Trailhead (station 9+350 to 9+400) – The existing parking area (40 vehicles) will be eliminated and a new area created. There will be parking for approximately 40 vehicles and five horse trailers. This parking area is approximately 70 meters (225 feet) from the road.

- Duck Creek Picnic Ground (station 12+300; Winter Closure Site) – This parking area is an expansion of the existing picnic area, parking area, and turnaround. This parking area is located approximately 305 meters (1,000 feet) off Guanella Pass Road, on FS Road 119. There will be parking for approximately 10 vehicles and four horse trailers.

- Guanella Pass (station 21+750 to 21+950) – New parking areas are proposed on both the eastern and western sides of the pass. The existing parking areas and pullouts would be reclaimed. All informal parking along the road will be eliminated. Two alternative entrance roads to the western parking area have been proposed, to avoid disturbing a lithic scatter that may be eligible for the NRHP. The FHWA is committed to performing biological surveys of the two new entrance roads prior to construction, in addition to addressing comments from Native American groups regarding potential impacts to TCPs. The west parking area will hold approximately 60 vehicles, and the east parking area will hold approximately 50 vehicles. Figure III-20 depicts the preliminary design for the Guanella Pass parking areas.

- Clear Creek Winter Closure Site (station 24+600) – This new parking area is located in an existing switchback south of the intersection with Naylor Lake Road, approximately 55 meters (180 feet) from Guanella Pass Road. There will be parking for approximately 35 vehicles. Construction of this parking area would impact old growth forest and occur in lynx habitat. If it is determined during the final design phase that it is possible to shift this parking area to minimize impacts to these resources, the FHWA will perform any additional environmental surveys during the appropriate times prior to construction.

- Cabin Creek Hydro Station (station 30+710 to 30+770) – The existing gravel pullout (room for 10 vehicles) will be improved and paved. There will be parking for approximately six vehicles.

- Clear Lake Parking Lot (station 32+000) – This existing parking area (45 vehicles) will be retained.

- Waldorf/Kirtley Mine Parking Area (station 35+000) – This existing parking area will be retained.

- Silverdale (station 35+750 to 35+800) – The existing parking area is proposed for expansion to include the Scenic Byway entrance facilities. This parking area is located approximately 45 meters (150 feet) off the road. This area will require a grade change including additional fill and the relocation of a powerline. There will be parking for approximately 20 vehicles.

Table III-16 lists the existing and proposed size, as well as the proposed area of new disturbance, for each parking area. The proposed construction limits include the parking area plus a 4.5 meter (15 foot) buffer for construction activities. The construction buffer will be reclaimed and revegetated with native species once construction of the parking area has been completed.

Table III-16
Existing and Proposed Parking Area Disturbance

Parking Area	**Existing Size** *Hectares (Acres)*	**Proposed Size** *Hectares (Acres)*	**Proposed Construction Limits** *Hectares (Acres)*	**Existing Disturbance Within Proposed Construction Limits** *Hectares (Acres)*	**Total Proposed New Disturbance** *Hectares (Acres)*
Geneva Creek Picnic Ground	0.03 (0.06)	0.03 (0.05)	0.03 (0.05)	0.03 (0.05)	0 (0)
Grant Byway Entrance	0 (0)	0.06 (0.15)	0.11 (0.26)	0 (0)	0.11 (0.26)
Whiteside Campground	0.05 (0.12)	0.05 (0.12)	0.05 (0.12)	0.05 (0.12)	0 (0)
Threemile Creek Trailhead	0.02 (0.06)	0.02 (0.06)	0.02 (0.06)	0.02 (0.06)	0 (0)
Burning Bear/Abyss Trailhead	0.12 (0.31)	0.40 (0.98)	0.56 (1.38)	0.02 (0.05)	0.54 (1.33)
Duck Creek Picnic Ground	0.03 (0.08)	0.11 (0.26)	0.19 (0.47)	0.02 (0.04)	0.17 (0.42)
Guanella Pass (combined)	0.34 (0.83)	0.65 (1.61)	1.13 (2.80)	0.06 (0.14)	1.08 (2.66)
Clear Creek Winter Closure Site (Naylor Lake)	0 (0)	0.18 (0.44)	0.34 (0.85)	0 (0)	0.34 (0.85)
Cabin Creek Pullout	0.06 (0.15)	0.06 (0.15)	0.06 (0.15)	0.06 (0.15)	0 (0)
Clear Lake	0.32 (0.78)	0.32 (0.78)	0.32 (0.78)	0.32 (0.78)	0 (0)
Waldorf/Kirtley Mine	0.05 (0.12)	0.05 (0.12)	0.05 (0.12)	0.05 (0.12)	0 (0)
Silverdale	0.07 (0.17)	0.18 (0.44)	0.30 (0.75)	0.06 (0.15)	0.25 (0.61)

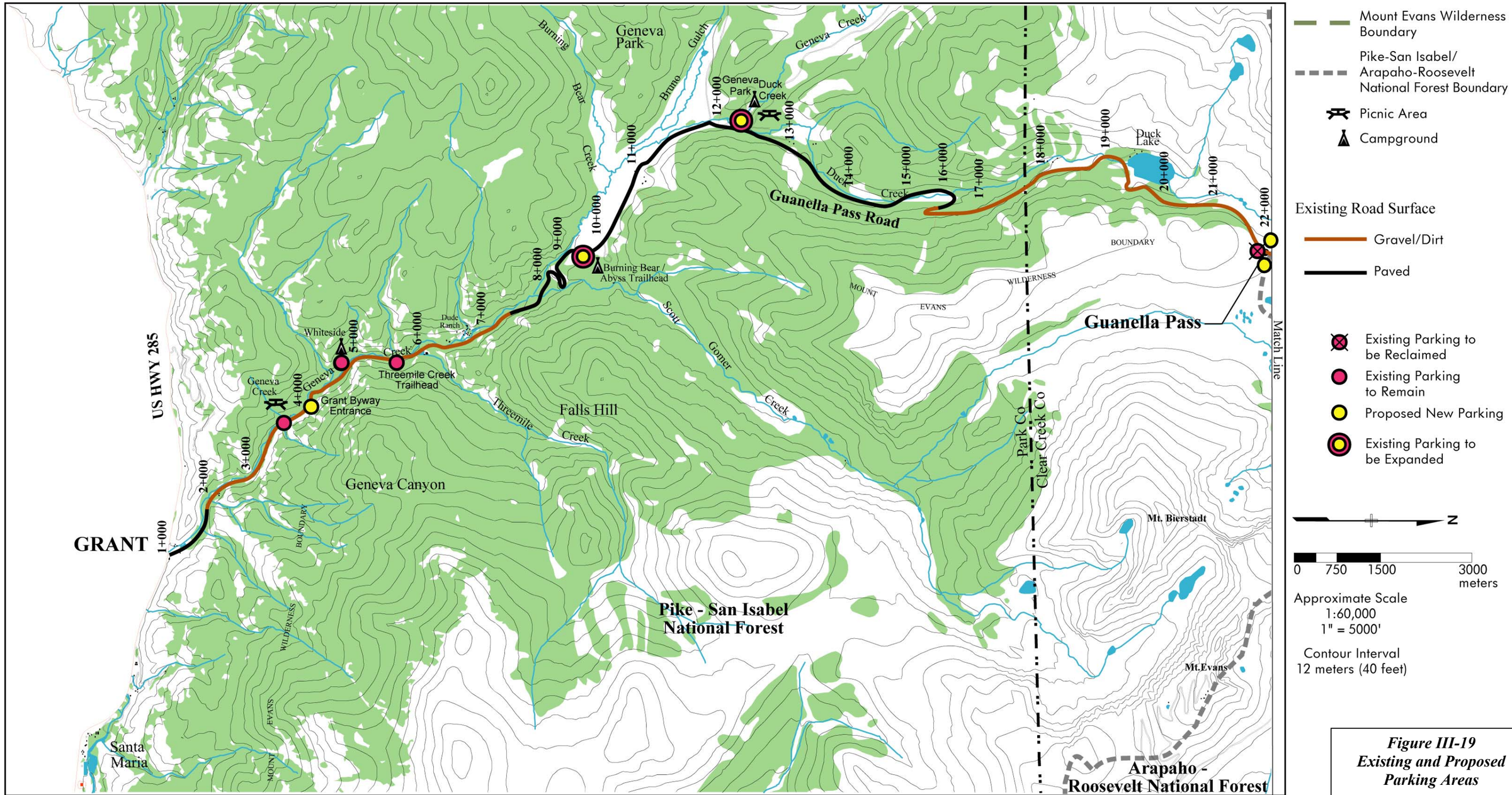


Figure III-19
Existing and Proposed Parking Areas

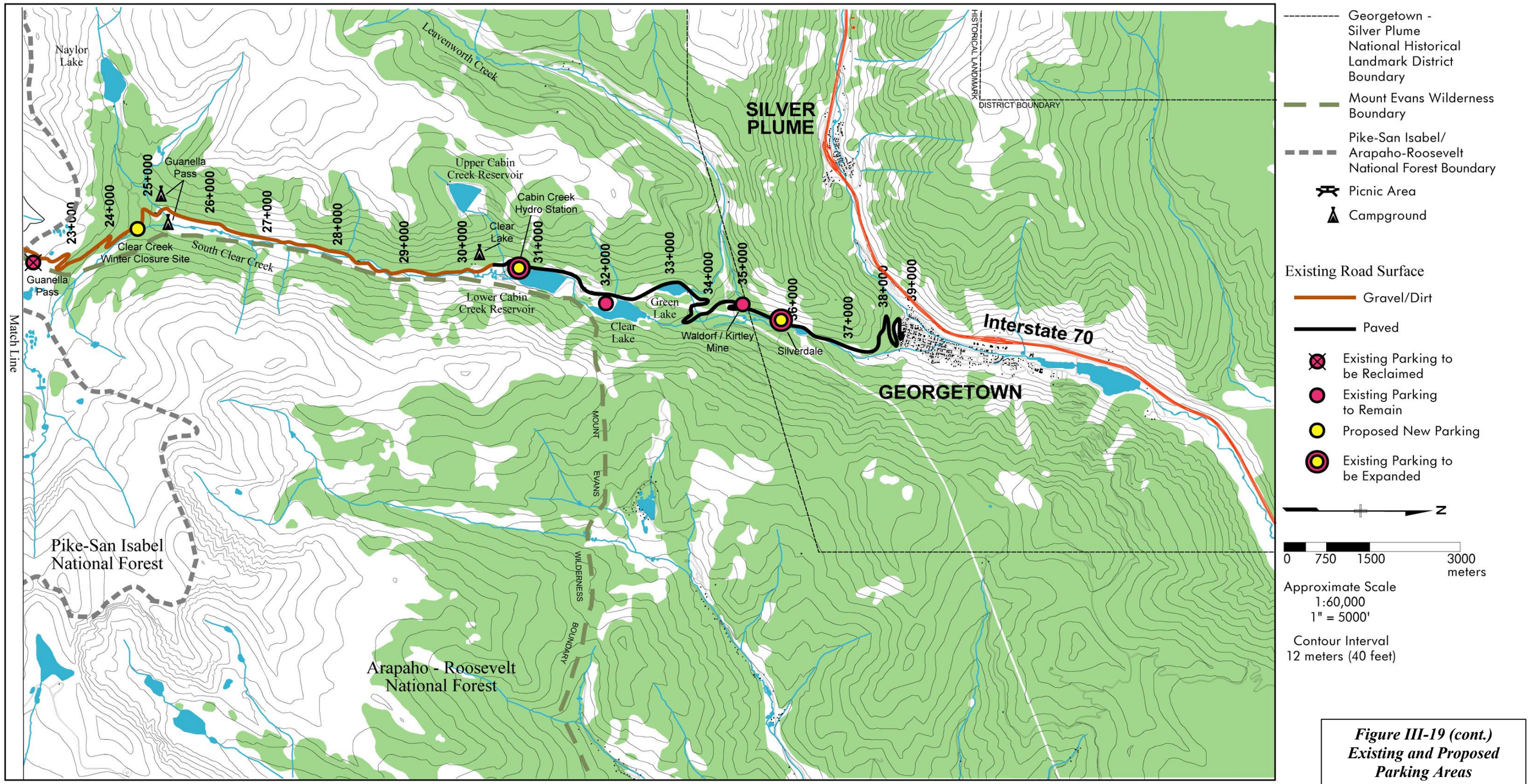


Figure III-19 (cont.) Existing and Proposed Parking Areas

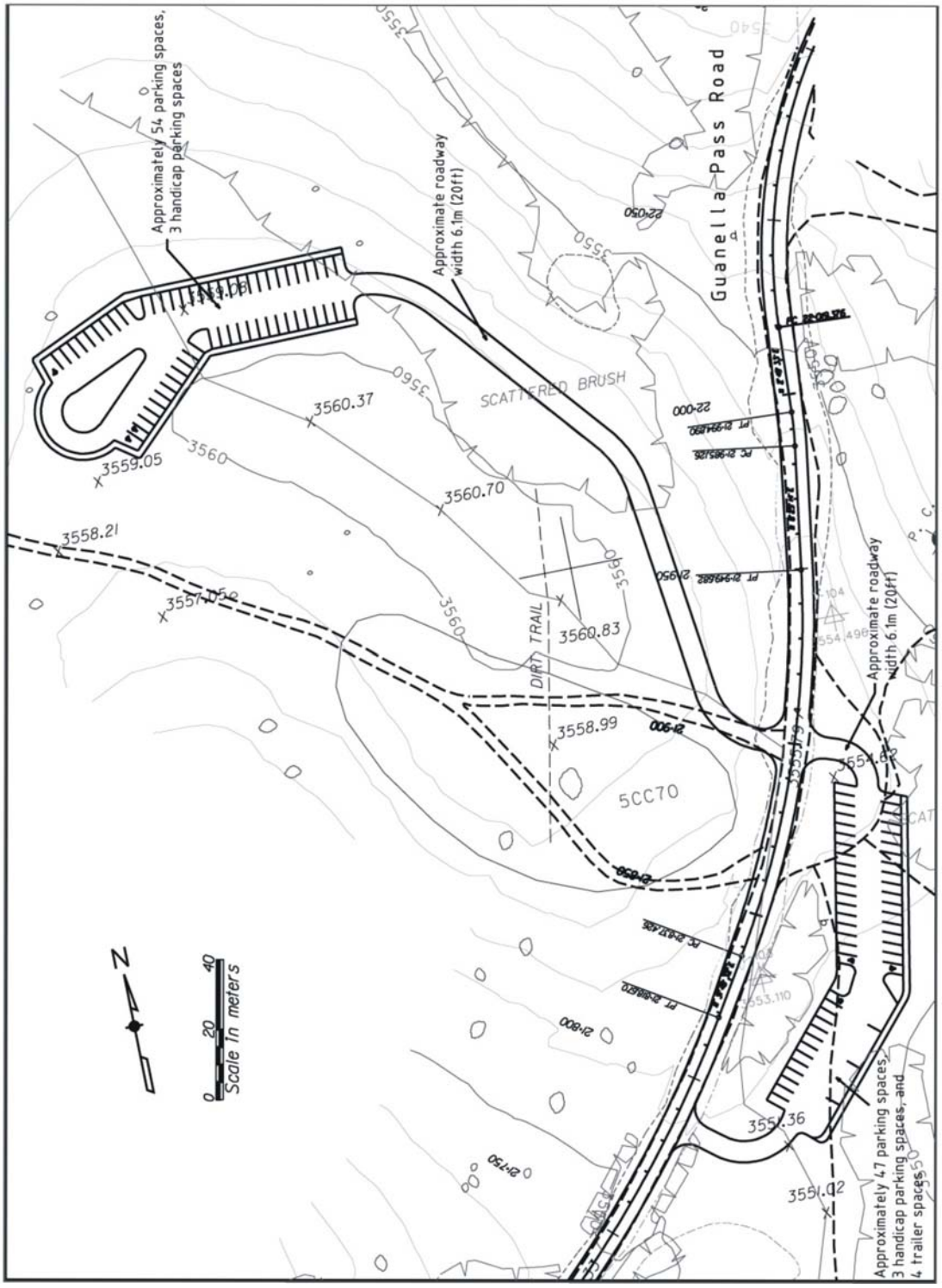


Figure III-20
Proposed Guanella Pass Parking Areas

The FS has indicated to the FHWA that it will not simply build parking to meet demand. Instead, the agency will limit parking to a level that is based on the physical and social carrying capacities of the area. The challenge will be to provide for as many opportunities as possible, while maintaining a satisfying experience for the users and protecting the natural resources. The FS anticipates that parking areas available in the future will accommodate levels of use similar to today's use, though it will be more tightly controlled.

The proposed parking at the Guanella Pass summit assumes that designated parking and/or a Wilderness use permit will limit Wilderness users. A total of approximately 110 parking spaces will be provided by two parking areas. This number of spaces will accommodate most short-term users except on peak days and hours. The parking area on the west side of the road will be closed during the winter to minimize impacts to wildlife.

Designated pullouts holding between two and four vehicles each will be provided at various locations along the corridor in all build alternatives. These pullouts will be developed during final design and will be located in coordination with the FS. The proposed number of developed parking spots is much lower than the number of dispersed parking areas currently available. Many of the existing pullouts will be incorporated into the driving surface when the road is reconstructed. Other existing pullouts, where use is causing resource damage, will be blocked off and revegetated.

The effect of winter closure will not be fully evaluated in this document. However, it has been determined that if winter closure is implemented, there will be a need to provide parking areas at the closure points. In Clear Creek County, there is currently a need for at least 15 spaces at the beginning of the Naylor Lake Road and an additional 35 spaces to accommodate winter recreation. In Park County, it is expected that the parking area near the Duck Creek Picnic Area will need to accommodate 10 vehicles as well as 4 vehicles with trailers. The effect of winter closure on the recreational activities in the Guanella Pass area is related to the response of people being placed farther away from their destination. Recreational users will be forced to park at the closure points and walk, snowshoe, or ski to their destination. This may reduce the desire of some people to recreate in this area and increase its appeal for others. People will likely recreate in areas immediately adjacent to parking areas causing the use in these areas to increase. Areas farther from parking lots that traditionally would have been more easily accessible will likely see a decrease in winter recreational use.

4c. Pedestrian and Bicyclist Use

Affected Environment

A variety of opportunities for bicycle and pedestrian use exist both on and off Guanella Pass Road. Bicycle uses include mountain biking on trails, jeep roads, or Guanella Pass Road. Pedestrian uses include hiking on the many trails within the NFs, Mt. Evans Wilderness Area, or along Guanella Pass Road. Pedestrian use of the road is not high because many trails provide a more enjoyable hiking experience.

Several single-track bicycle trails in the area have been written up in mountain bicycle guide books. These include trails along Bruno Gulch, Burning Bear Trail, Geneva Creek, and South Park Trail. These trails are all located in the Pike NF on the west side of Guanella Pass Road. A fairly popular ride on the Georgetown side of the pass is up Guanella Pass Road from Georgetown to the Waldorf cut-off over the Argentine railroad grade that continues into Silver Plume. Several bicycle races have included portions of Guanella Pass Road in their routes, including the popular "Triple Bypass."

Bicyclists who currently use Guanella Pass Road encounter several problems. Bicyclists on the dirt portion of the road inhale dust from the auto traffic on the road, especially on summer weekends. Currently, the road has no shoulders that would provide a margin of safety. Other safety considerations for bicyclists include tight curves with blind spots and limited sight distances.

Environmental Consequences

Compared to the existing condition of the road, the build alternatives reduce the amount of dust produced by vehicles on the road if an alternative surface type is used in gravel sections. The experience of the pedestrian and cyclist is enhanced by the reduction in dust.

Adding width to the roadway to accommodate pedestrians and bicycles was eliminated from consideration because of the additional environmental impacts that would occur (see **Chapter II.F.4: Additional Widening for Pedestrians and Bicycles**).

Alternative 1

Alternative 1 does not change the current situation for the pedestrian or bicyclist. Existing dust and safety problems are not addressed. The projected increase in traffic will make these problems worse over time.

Alternatives 2, 4, and 5

Alternative 2 reconstructs the roadway with a paved surface, which eliminates the dust problem. Alternative 4 and Alternative 5 reconstruct and pave parts of the existing road, resulting in 85 percent of the road being paved. This reduces the existing dust problem by increasing the paved surface from 48 percent to 85 percent of the road.

Alternatives 2, 4, and 5 may change the bicycling use on the road from a "mountain bike" experience to a "touring bike" experience because of the increased amount of paved surface. All reconstructed sections would have a 0.6 meter (2 foot) wide shoulder on each side of the road. Bicyclists, pedestrians, and automobiles would have to share the road, as the shoulders would be too narrow to accommodate vehicles passing bikes or pedestrians without encroaching on the oncoming lane. However, the increase in site distance will contribute to an increase in safety for pedestrians and bicyclists.

Alternative 3

Alternative 3 reconstructs the roadway with a gravel surface in areas that are currently gravel or dirt (52 percent of the road). Initially, dust is reduced from the current condition but eventually becomes worse as the surface deteriorates until eventually the dust problem is similar to the existing condition.

Alternative 6

The proposed improvements for Alternative 6 include a shoulder 0.6 meters (2 feet) wide. However, this shoulder is too narrow to accommodate bicyclists, who would still need to share the road with automobile traffic. Some of the existing tight curves are reconstructed with more gradual curves, reducing the number of blind spots and improving sight distances. Although traffic will be traveling at slightly increased speeds in a more open corridor, this hazard potential will be offset by increased stopping sight distance and better vehicle handling because of the improved road surface and geometry.

Because it has fewer paved sections than Alternatives 2, 4, or 5, Alternative 6 will produce more dust. This can be reduced by the use of alternative surface types or dust suppressants on gravel sections of the road. The typical roadway cross-section in reconstruction areas is narrower for Alternative 6 than the other build alternatives and not as pedestrian/cyclist-friendly. Although Alternative 6 produces the least amount of traffic of the build alternatives, additional traffic from the improved roadway may make the road less safe for walkers and bicyclists and a less pleasant place to walk or ride a bike. However, these adverse impacts will be offset with the increase in hardened surfacing (for dust reduction) and the increase in shoulder width and sight distance (for safety concerns).

A more detailed analysis of this topic is provided in the *Guanella Pass Road Colorado Forest Highway 80 Bicycle and Pedestrian Use Technical Memorandum* (MK Centennial and Hermsen Consultants, March 1997).

5. Plants and Animals

5a. General Wildlife

Affected Environment

Guanella Pass Road crosses habitat typically associated with the upper montane, subalpine, and alpine tundra ecosystems of the Front Range in Colorado. Mule deer, elk, and bighorn sheep winter range is crossed by the first 4.8 kilometers (3 miles) of the route north of Grant. During spring, bighorn sheep use cliffs and adjacent steep terrain on both sides of the road in the Threemile Gulch-Arrowhead Mountain area (station 6+000 to station 8+000) as a lambing area. Geneva Creek is used by bighorn sheep as a source of water.

Beyond station 8+000, the road transects habitats used by deer, elk, and bighorn sheep during spring, summer, and fall. Subalpine forest and alpine tundra provide habitat for Rocky Mountain goats, which occupy higher elevations east and west of the road. Beaver, black bear, bobcat, mountain lion, and a variety of small and medium-sized mammals are common and occupy montane habitats in the vicinity of the road throughout the year.

Riparian forest, shrub stands, and cliffs along Geneva Creek provide nesting habitat for breeding birds including songbirds, waterfowl, and birds of prey (raptors). Red-tailed hawks, Cooper's hawks, golden eagles, and goshawks nest in and adjacent to the road corridor. Upper montane and subalpine forests and meadows crossed by the existing road provide breeding habitat for songbirds, waterfowl, raptors, and blue grouse.

Willow-dominated habitats at and above treeline in the vicinity of Guanella Pass provide winter habitat for an estimated 200 or 300 white-tailed ptarmigan from October through April. The Guanella Pass area is recognized as a regionally important winter concentration area for ptarmigan, some of which migrate to the area from surrounding summer ranges as far as 64 kilometers (40 miles) away.

South Clear Creek and adjacent beaver ponds provide habitat for brook trout, rainbow trout, brown trout, Snake River cutthroat, and "cutbows" (rainbow-cutthroat hybrids). Populations of these fish are currently being maintained through natural reproduction. Duck Creek supports a self-sustaining population of brook trout. Geneva Creek above its confluence with Scott Gomer Creek has no fish as a result of AMD impacts and/or bedrock geology that makes this reach unsuitable for trout. Below Scott Gomer Creek, the AMD is apparently diluted and a naturally reproducing trout population exists. Brook, brown, rainbow, and Snake River cutthroat trout inhabit Geneva Creek below the Scott Gomer Creek confluence. Streams and ponds along the road receive moderate fishing pressure during the spring, summer, and fall months.

Wildlife and wildlife habitats are protected under federal laws including the Endangered Species Act (ESA), the Migratory Bird Treaty Act, the Bald Eagle Protection Act, the Fish and Wildlife Coordination Act, the Federal Land Policy and Management Act, and the NEPA. In accordance with FS regulations and policy, an evaluation of potential impacts was prepared in coordination with the FS for species identified as FS Region 2 sensitive species (SS) as well as wildlife species identified as management indicator species (MIS) in the land and resources management plans for the Arapaho and Pike NFs. Potential impacts to management indicator species are discussed in **Chapter III.B.5c: Management Indicator Species**. In addition, a Biological Assessment (BA) was prepared to evaluate potential effects of Alternative 6 on federally listed threatened and endangered species for Section 7 coordination with the USFWS. The species evaluated in the BA for Alternative 6 are also evaluated in the Biological Report (BR) for all alternatives. Potential impacts to federally listed threatened, endangered, candidate, and FS sensitive species are discussed in **Chapter III.B.5b: Threatened, Endangered, and Sensitive Species**.

Environmental Consequences

Alternative 1

Alternative 1 may result in adverse impacts to aquatic systems due to continual road erosion and sedimentation into neighboring streams. An increase in wildlife mortality and habitat disturbance may result due to increased traffic and recreational use of the area under Alternative 1, though to a lesser extent than any of the build alternatives.

All Build Alternatives

Direct impacts to fish and wildlife habitat can be anticipated as a result of removal of shrub and emergent wetlands, forest, and alpine tundra habitat during construction activities. Habitat loss would be caused by creation of new roadway slopes, with the greatest area of effect caused by Alternatives 2 or 3 with 38.7 hectares (95.7 acres), then 4 or 5 with 22.8 hectares (56.3 acres), and the least by Alternative 6 with 15.4 hectares (38.1 acres) (Table III-11). Effects to specific habitat complexes are documented in the *Biological Report, Guanella Pass Road, Colorado Forest Highway 80* (Western Consulting Group and FHWA, July 2002). Local impacts to aquatic habitats, including streams and wetlands, are also anticipated as a result of physical disturbance of streambeds at road crossings and sediment loading during construction activities.

Displacement of birds and mammals due to construction disturbance will be short term and not substantial if mitigation activities are undertaken, including selective timing of habitat disturbance and revegetation to achieve pre-impact structural diversity. Similarly, impacts to aquatic biota will be limited in extent and duration with effective implementation of mitigation.

Long-term positive impacts will result from stabilization of most of the existing road cut and fill problem areas and reduction in airborne particulates (dust) through surface stabilization. Aquatic habitat will be improved by a decrease in sediment discharge from the existing road into stream and wetland areas during runoff events, and potential stream improvements at nine existing stream crossings.

The magnitude of potential adverse impacts of an improved road on wildlife in the affected area will be partially dependent upon the changes in the traffic volume and speed of vehicles which travel the road in comparison to current conditions. Some improvement in sight distances and roadway width would be expected to reduce these effects. A long-term increase in vehicle-wildlife accidents are anticipated under all of the alternatives as a direct result of increased traffic volumes above current conditions. Potential adverse effects of the project on wildlife would be greatest under Alternatives 2 and 3, somewhat reduced in magnitude under Alternatives 4 and 5, and least under Alternative 6.

5b. Threatened, Endangered, and Sensitive Species

Affected Environment

Threatened and Endangered species are those protected by the ESA, which is administered by the USFWS. FS sensitive species are those included in the FS Region 2 list. The BR (*Biological Report, Guanella Pass Road* (2002)) addresses potential impacts to threatened, endangered, FS sensitive, and FS management indicator species of all alternatives. The BA (*Biological Assessment, Guanella Pass Road* (2002)) addresses potential effects of the Preferred Alternative (Alternative 6) on Federally listed Threatened and Endangered species. The Federal species list was verified on July 18, 2002 (see correspondence in **Appendix A**). If a build alternative other than Alternative 6 is selected, the BA will need to be revised.

A list of TES species evaluated and their status is shown in Table III-17. In addition to the species on the list, two former USFWS candidate plant species, three FS plant species of special concern, and 49 plants that have been classified as sensitive by the Colorado Natural Heritage Program (CNHP) were evaluated.

Literature review, contacts with state and federal research biologists, and field surveys (including 100 percent pedestrian surveys for plants) were used in the biological analyses to evaluate the status (presence/absence) of the species in the project area. The entire road corridor was searched on foot during 1995 and 1996 to gather information about species within the area of potential project impacts. The Affected Environment for species discussed individually is combined with the subsection for that species under Environmental Consequences, below.

Environmental Consequences

Species discussed individually are those which may be affected and those for which mitigation is proposed to reduce or eliminate adverse effects. Effects to species are shown in the right column of Table III-17. The following discussion contains results presented in the BR and the BA. Mitigation is discussed in **Chapter IV: Mitigation**.

Canada Lynx (Federally Threatened-State Endangered)

Available evidence suggests that Canada lynx historically occurred in the Guanella Pass area and may have been present in the area as recently as 1979-1980. The CDOW's lynx reintroduction program was responsible for releasing 19 males and 22 females in 1999 in southern Colorado. In 2000, an additional 20 males and 35 females were released. All were tracked using radio collars. As of early 2002, 39 of the reintroduced lynx were known to be dead, 41 were still being tracked, and the remaining 16 were missing. There has been no evidence of reproduction. It is not known whether the population can become self-sustaining.

At least four of the reintroduced lynx have been killed on highways. Site characteristics (road geometry, posted speed limits, surrounding topography and vegetation cover) at locations where these mortalities occurred are highly variable; however, each of the roads are paved, and maximum vehicle speeds range between 72-112 km/hr (45-70 mph).

Lynx habitat in the western U.S. consists primarily of two forest types that must be linked by travel cover (dense overhead vegetation) that allows movement of lynx within their home ranges. The Canada lynx prefers early successional forests where they hunt snowshoe hares, their principal prey. Late successional forest stands containing dead-falls are preferred for denning. Lynx have been observed to travel along roadways within 15 meters (50 feet) of roads where adequate travel cover is present on both sides of the road. Coniferous or deciduous vegetation greater than 2 meters (6 feet) in height with a closed canopy, adjacent to foraging habitats, is considered suitable as travel cover for lynx. In the Guanella Pass area, subalpine fir, Engelmann spruce, and Douglas fir are most frequently used by snowshoe hares and are most likely to support lynx.

The effects of year around recreation are a risk factor for lynx in higher elevations of the Guanella Pass area. Snow-shoeing and Nordic skiing are popular activities throughout the subalpine forest and willow shrublands in the Guanella Pass area. A network of trails is created by backcountry recreationists, resulting in compaction of snow, which provides coyotes, bobcats, and mountain lions access to prey in potential lynx habitat.

Table III-17
Threatened, Endangered, and FS Sensitive Species

Common Name	Scientific Name	Status	Effect
Animals			
Canada Lynx	*Felis lynx canadensis*	UST, SE	likely to adversely affect*
Boreal Western Toad	*Bufo boreas boreas*	C, SE	not likely to adversely affect*
Southwestern Willow Flycatcher	*Empidonax trailii extimus*	USE	no effect
Bald Eagle	*Haliaeetus leucocephalus*	UST, ST	no effect
Greenback Cutthroat Trout	*Oncorhynchus clarki stomias*	UST, ST	no effect
North American Wolverine	*Gulo gulo luscus*	SE	no effect
Northern Goshawk	*Accipiter gentilis*	R2	MAI-NLT*
Dwarf Shrew	*Sorex nanus*	R2	MAI-NLT
Pygmy Shrew	*Microsorex hoyi montanus*	R2	MAI-NLT
American Marten	*Martes americana*	R2	MAI-NLT
Townsend's big-eared bat	*Plecotus townsendii*	R2	MAI-NLT
Pygmy Nuthatch	*Sitta pygmaea*	R2	MAI-NLT
Golden-crowned Kinglet	*Regulus satrapa*	R2	MAI-NLT
Fox Sparrow	*Passerella iliaca*	R2	MAI-NLT
Northern Leopard Frog	*Rana pipiens*	R2	MAI-NLT
Boreal Owl	*Aegolius funereus*	R2	no impact*
Black Swift	*Cypseloides niger*	R2	no impact
Three-toed Woodpecker	*Picoides tridactylus*	R2	no impact
Olive-sided Flycatcher	*Contopus borealis*	R2	no impact
Tiger Salamander	*Ambystoma tigrinum*	R2	no impact
Plants			
Penland Alpine Fen Mustard	*Eutrema penlandii*	UST	no effect
Porter's Feathergrass	*Ptilagrostis porteri*	C, R2	no impact*
Reflected Moonwort	*Botrychium echo*	R2	MAI-NLT*
Moonworts	*Botrychium lineare, B. pallidum*	R2	MAI-NLT
Northern Blackberry	*Cylactis arctica*	R2	no impact*
Brownnie (Purple) Lady's-Slipper	*Cypripedium fasclculatum*	R2	no impact
Weber's Monkeyflower	*Mimulus gemmiparus*	R2	no impact
Sea Thrift, Sea Pink	*Armeria scabra*	R2	no impact
Prairie (Iowa) Moonwort	*Botrychium campestre*	R2	no impact
Livid Sedge	*Carex livida*	R2	no impact
White Cottongrass	*Eriophorum altaicum*	R2	no impact
Hall's Fescue	*Festuca hallil*	R2	no impact
Greenland Primrose	*Primula egaliksensis*	R2	no impact
Low Blueberry Willow	*Salix myrtillifolia*	R2	no impact
Autumn Willow	*Salix serissima*	R2	no impact
Little Bulrush, Rolland's Bulrush	*Scirpus rollandii*	R2	no impact
Larimer Cinquefoil	*Potentilla effusa var. rupincola*	R2	no impact
Invertebrates			
Rocky Mountain Clamshell Snail	*Acroloxus coloradensis*	R2	no impact
Lost Ethmiid Moth	*Ethmia monochella*	R2	no impact
Steven's Tortricid Moth	*Decodes stevensi*	R2	no impact
Source: Guanella Pass Road Colorado Forest Highway 80 Biological Assessment.			
SE: State endangered species *USE: USFWS endangered species* *ST: State threatened species* *UST: USFWS threatened species* *C: USFWS Candidate for listing* *R2: FS Region 2 Sensitive* MAI-NLT: May affect individuals but not likely to lead to a trend toward Federal listing ** Mitigation proposed to reduce or eliminate impacts*			

As a result of increased traffic and potentially increased vehicle speeds, the probability of lynx-vehicle encounters increases, as does the potential for lynx mortality. Improved sight distances would reduce the potential for direct effects. Any increase in mortality of lynx will adversely affect the viability of this species in Colorado.

Features of the reconstructed road such as retaining walls taller than 1.5 meters (5 feet) could be a barrier to lynx movement. Field inspection of areas where retaining walls and guardrail would be constructed suggests that the potential for lynx movement across the road may be affected at certain specific locations; however, most of these also contain short stretches where no retaining walls are proposed, and so may be used by lynx.

Under all alternatives, the projected magnitude of increased traffic and increased levels of human occupation of the road corridor are expected to result in avoidance of the area by lynx. If recreation were to increase in proportion to projected increased traffic from 1995 to 2025, the increase at the pass would be 56 percent for Alternative 1, 181 percent for Alternatives 2, 4, or 5 (high estimate), 110 percent for Alternative 3, and 88 percent for Alternative 6.

Both the east-side and west-side summit parking areas are in a linkage area where lynx apparently cross the mountain, and are located between areas of lynx habitat (defined by the FS, the USFWS, and the CDOW). Both parking areas are near dense, continuous willow fields that likely provide alpine cover for movement and possibly forage for lynx. The proposed parking areas at the summit could affect use of the area as a linkage for lynx, particularly during the winter because compaction of snow by recreationists would allow better access to other carnivore predators that would compete with the lynx and possibly prey on lynx. To minimize these effects, the FS has determined that the parking area on the west side will be closed during the winter.

All build alternatives may affect and are likely to adversely effect the lynx. Potential effects are mainly related to traffic volume and speed, and would be greatest under Alternates 2, 4, or 5, less under Alternative 3, then 6, and least under Alternative 1. Effects related to barriers to travel (retaining walls, high cut slopes) would be greatest under Alternatives 2 or 3, less under Alternatives 4 or 5, then 6, and least under Alternative 1. The status of the lynx, along with direct, indirect, and cumulative effects, is more fully discussed in the *Biological Assessment, Guanella Pass Road* (2002) and the *Biological Report, Guanella Pass Road* (2002).

The FHWA is currently in formal consultation with the USFWS because Alternative 6 may adversely affect the lynx. Lynx mitigation discussed in this document may be revised based on the contents of the Biological Opinion.

Boreal Western Toad (Federal Candidate, State Endangered)

The boreal western toad inhabits subalpine and alpine wetlands at elevations ranging between 2,130 meters (7,000 feet) and 3,930 meters (12,900 feet), and was at one time a fairly common inhabitant of high elevation wetlands throughout mountainous areas of Colorado. During the 1970s and 1980s, this species experienced substantial population decline throughout its range in Colorado and Wyoming. Based upon what is known of the historic distribution of this species, all areas of subalpine and alpine wetlands are generally considered potential habitat for the boreal western toad.

The toad is known to occupy three locations in Clear Creek County, including two sites in the Clear Creek drainage basin where reproduction has been documented. In 1994, a breeding population was located on the South Fork of Clear Creek adjacent to Guanella Pass Road. During the summers of 1995 and 1996, the CDOW conducted searches of the breeding ponds located during 1994 and all areas of potentially suitable habitat within the road corridor from Georgetown to Geneva Park. During the summer of 1995, the CDOW search team identified and mapped three areas of occupied habitat in the Guanella Pass Road corridor, including the breeding ponds located during 1994. The CDOW also mapped "potential habitat" and "migratory habitat" for the toad. This mapping was used as the basis for analysis of the potential impacts of the build alternatives. Five adult toads and nine juveniles were located at the breeding pond during the 1995 search efforts; however, no evidence of current year reproduction (egg masses or tadpoles) was located within the study area. During 1996, no evidence of current-year reproduction was found at the breeding ponds along the South Fork of Clear Creek; however, eight adults and two sub-adults were located during visits to this site. Monitoring of this site was limited after 1996. However, in 1999, 41 sub-adult toads were located at the pond by the CDOW.

All build alternatives may adversely affect the boreal western toad through physical alteration or removal of existing roadside wetland habitats, or increased mortality as a result of increased traffic. A summary of potential impacts to boreal western toad habitat by alternative is provided in Table III-18.

Water quality impacts to aquatic habitats used by boreal western toads may occur from runoff from the roadbed due to periodic discharge of chemicals which may be used to stabilize a gravel road surface. Effects for the alternatives would be proportional to the extent of gravel surfacing.

Habitat would be improved by reducing sedimentation of wetlands and riparian areas which is currently being caused by roadway runoff (identified in **Chapter I: Purpose and Need** as a need for the project). The greatest benefits from sediment reduction would be provided by Alternative 2 with full paving and maximum opportunity to repair eroding slopes, followed by Alternatives 6, 5, 4, and 3. Alternative 1 would provide no benefits, and existing erosion problems would be expected to worsen.

Mitigation for impacts to potential breeding habitat and migratory habitat may effectively reduce the potential for adverse impacts to the boreal western toad population along South Clear Creek. Impacts could be mitigated through minor adjustments to the road alignment and site-specific design measures to minimize potential hydrologic impacts to wetlands in areas identified as boreal western toad habitat. Placement of drift fences along the road in high priority areas may encourage toads to cross Guanella Pass Road through oversized drainages or designed tunnels beneath the road.

Due to reduction in sediment, all alternatives except 1 and 3 would probably result in a situation no worse than, and probably better than, the existing conditions for the boreal western toad.

Table III-18
Potential Impacts to Boreal Western Toad Habitat
Area of Potential Habitat Disturbance by Alternative
hectares (acres)

Habitat Type	Alt 1	Alt 2	Alt 3	Alt 4 or 5	Alt 6
Occupied Breeding Habitat	0	0.08 (0.2)	0.08 (0.2)	0.08 (0.2)	0.04 (0.10)
Potential Breeding Habitat	0	2.7 (6.5)	2.7 (6.5)	2.0 (4.9)	1.59 (3.95)
Migratory Habitat	0	1.2 (3.0)	1.2 (3.0)	0.05 (0.12)	0.04 (0.11)
Source: *Guanella Pass Road Colorado Forest Highway 80 Biological Assessment.*					

Northern Goshawk (R2 FS Sensitive)

Throughout their range in the Northern Rocky Mountains, Northern Goshawks nest in mixed conifer and deciduous forest stands along the edge of mountain valleys and stream bottoms. Northern Goshawks may return to nest at the same location year to year and are known to be sensitive to disturbance of their nests.

Northern Goshawks were observed north and south of Guanella Pass during the 1995 raptor survey and again during the 1996 raptor survey, and at least one pair of goshawks occupied a nesting territory that encompassed portions of the road corridor in the Geneva Park vicinity. Monitoring conducted by the FS during 1998-1999 also indicated that at least one pair of goshawks occupied habitats in the vicinity of Geneva Park during the nesting season.

Due to the extreme low densities of this species throughout the project area and the wide array of habitat types that may be used for foraging, quantification of most habitat types across the project area would highly skew the amount of actual habitat that may be occupied.

Under all build alternatives, road improvement construction activities in the vicinity of Geneva Park would likely result in northern goshawk avoidance of foraging areas and decreased nesting success. Alternative 6 and Alternative 5 propose to rehabilitate the road in this area, resulting in less construction disturbance than Alternatives 2 and 3. Construction under Alternative 4 would not impact areas identified as occupied by Northern Goshawks during the 1995 and 1996 field surveys but could affect habitats within the nesting territories of other nesting pairs.

Protocol surveys will be conducted during May–June of the year prior to construction to identify goshawk use areas (for contracting information), and follow-up same-year (as construction) surveys will be conducted in the identified use areas to determine whether scheduling of construction activities is needed to avoid nesting/foraging territories during May-August. Restrictions will be determined in coordination with the FS. Buffer zones may be established within 0.40 kilometer (0.25 mile) of nest sites, depending on terrain and other factors. Even with this mitigation, any build alternative may affect individual goshawks, but none would be likely to result in a loss of viability in the area or cause a trend toward federal listing or loss of species viability rangewide.

Dwarf Shrew (R2 FS Sensitive)

This species is known from Montana, Wyoming, Utah, Colorado, Arizona, New Mexico and South Dakota. In Colorado, dwarf shrews have been collected in Larimer County, along the Arkansas River drainage, near Durango, and in Mesa Verde National Park at elevations between 1,620 to 3,500 meters (5,300 to 11,500 feet.). Dwarf shrews have been captured in abundance at several locations, which suggests that they can be locally common in suitable habitat, although the species is considered unusual in the project area.

Dwarf shrews are found in a variety of habitats including edges of alpine and subalpine rockslides, spruce-fir bogs, coniferous forests, sedge marshes, open woodland, dry brushy hillsides, and in grasslands. Breeding occurs in June and July in alpine and subalpine areas, but may occur earlier at lower elevations. Though the species prefers moderately moist habitats, it is less restricted to water than are other shrews. It can also tolerate arid to semiarid conditions, as many shrews have been documented up to 0.8 kilometer (0.5 mile) from water sources. This indicates that the dwarf shrew is probably more widely distributed than records indicate.

Surveys were not conducted to assess the presence and distribution of this species in the study area. As a conservative approach in this analysis, it has been assumed that potential habitat for the dwarf shrew is present and occupied.

There would be an increased probability of roadkill in proportion to projected traffic increases for all alternatives; however, this effect is not expected to be substantial for any alternative. Alternative 1 would not disturb potential dwarf shrew habitat. Alternatives 2 and 3 would result in disturbance of approximately 14.6 hectares (35.5 acres) of potentially suitable dwarf shrew habitat, Alternatives 4 and 5 would result in disturbance of approximately 7.2 hectares (17.7 acres), and Alternative 6 would impact approximately 4.3 hectares (10.0 acres) of potential habitat for this species.

Any of the build alternatives may impact individuals but, because of the abundance of suitable habitat in the project vicinity, none would be likely to result in a loss of viability in the area or cause a trend toward federal listing or loss of species viability rangewide.

Pygmy shrew (R2 FS Sensitive)

Prior to 1961, this species was not known to occur south of Montana. Information concerning the abundance and distribution of this species in Colorado is very limited. Since 1961, the pygmy shrew has been captured at several locations in Colorado including sites in Larimer, Grand, and Gunnison Counties. The known distribution of the pygmy shrew is disjunct, and the population that exists in extreme southern Wyoming and the central Colorado mountains represents the extreme southern extent of its distribution. It is possible that this species occupies suitable habitat throughout the mountains of central Colorado. As of 1990, no records of the occurrence of pygmy shrews had been made in the project area.

The species has been found in subalpine forests, clear-cut and selectively logged forests, forest-meadow edges, boggy meadows, willow thickets, aspen-fir forests, and subalpine parklands. Pygmy shrews build runways under stumps, fallen logs, and litter. Pygmy shrews breed once per season in the warmer months and may have up to eight young in the litter. Its diet is mainly insects and other invertebrates.

Surveys were not conducted to assess the presence and distribution of this species in the study area. As a conservative approach in this analysis, it has been assumed that potential habitat for the dwarf shrew is present and occupied.

There would be an increased probability of roadkill in proportion to projected traffic increases; however, this effect is not expected to be substantial for any alternative. Alternative 1 would not disturb dwarf shrew habitat. Alternatives 2 and 3 would result in disturbance of approximately 14.0 hectares (34.6 acres) of potentially suitable dwarf shrew habitat, Alternatives 4 and 5 would result in disturbance of approximately 6.8 hectares (16.9 acres), and Alternative 6 would impact approximately 6.3 hectares (14.9 acres) of potential habitat for this species.

Any of the alternatives may impact individuals but, because of the abundance of habitat in the vicinity, none would be likely to result in a loss of viability in the area or cause a trend toward federal listing or loss of species viability rangewide.

American Marten (R2 FS Sensitive)

Considered apparently secure in Colorado, marten occur throughout Alaska, Canada and the lower 48 states except for areas within the Midwest and the entire South. The marten is a fairly common inhabitant of subalpine spruce and spruce-fir forests throughout the western two-thirds of Colorado. Natural reestablishment and reintroduction programs have contributed to a moderate comeback in some areas of the northern U.S. including northern New England and the Great Lakes region. In Colorado, they occur in most areas of coniferous forest habitat in the high mountains. Martens are found in spruce/fir, lodgepole, limber pine, and alpine transition areas, in rock and talus fields, and occasionally above treeline.

Marten trapping ceased in 1995 when the CDOW closed the season and a ballot initiative closed the state to take of all furbearers by snares. Population appears to be increasing, and surveys have found marten to be widely distributed across the state in suitable habitat and the fifth most common mammal behind red squirrels, snowshoe hare, weasel, mice/vole, and coyotes.

Martens are believed to be present within the general project area due to recent records. Surveys to assess the presence and distribution of martens in the Guanella Pass Road corridor were not conducted for this project. As a conservative assumption, it has been presumed that potential habitat for this species exists in all mature subalpine forests within the road corridor and that this habitat is occupied. Within the road corridor, the area that provides the best habitat for martens occurs within the upper reaches of the subalpine forest in the headwaters of the South Fork of Clear Creek and Duck Creek.

Timber removal activities may indirectly impact marten by removal of potential den structures, stand density, and canopy cover, although the potential for a den tree to be located adjacent to Guanella Pass Road is highly unlikely. Removal of trees may also reduce foraging habitat.

Physical removal of approximately 5.4 hectares (13.3 acres) of potential marten foraging habitat would occur during construction of Alternatives 2 or 3, 5.0 hectares (12.5 acres) under Alternatives 4 or 5, and 3.4 hectares (7.8 acres) under Alternative 6.

Any of the alternatives may impact individuals but, because of the abundance of habitat in the vicinity and the unlikelihood of den sites adjacent to the road, none would be likely to result in a loss of viability in the area or cause a trend toward federal listing or loss of species viability rangewide.

Townsend's Big-eared Bat (R2 FS Sensitive; FS MIS)

Townsend's big-eared bats range from central British Columbia south and east to the Black Hills, central Oklahoma, northern Baja, and central Mexico with disjunct populations in the Ozarks and central Appalachians. This species is regularly seen or captured throughout the western two-thirds of Colorado in association with semi-desert shrublands, pinion-juniper woodlands, and open montane forest habitats.

These bats use caves, rock crevices, abandoned mine shafts, and abandoned buildings as day roosts and hibernation sites. This species has very specific habitat requirements and are sensitive to temperature fluctuations and human disturbance at roost sites. Records of this species occurrence in the project area were recorded prior to 1990, and one adult male was captured in the Clear Creek Ranger District in 1992. Searches of the existing road corridor during 1995-1996 did not reveal suitable roost sites for Townsend's big-eared bats; however, they may forage in the project area.

No suitable roosting sites for the species were found within the project area and, therefore, the build alternatives are not expected to result in any effects on the bat's winter or summer roosting habitat. Potential impacts of the build alternatives may occur to foraging habitat during construction across drainages and along water bodies.

Any of the build alternatives may impact individuals but, because no suitable roosting sites for the species were found within the project area, none are likely to result in a loss of viability in the area or cause a trend toward federal listing or loss of species viability rangewide.

Pygmy Nuthatch (R2 FS Sensitive; FS MIS)

The pygmy nuthatch is a fairly common to common resident of lower montane and foothills ponderosa pine forests in the Front Range of Colorado. This species is primarily found in open ponderosa pine forests, though lodgepole pine, Douglas-fir, and subalpine spruce-fir forests are also used as foraging habitat throughout the year.

This species has been found in the Georgetown area and in areas located to the east and north of the study area. It is believed that Guanella Pass Road lies on the periphery of this species habitat due to its high elevation. Based on the few records, however, it is assumed that suitable habitat does exist within the project area to some degree and is occupied by this species.

Timber removal activities have the potential to impact pygmy nuthatches through removal of snags or live trees that could provide suitable nesting habitat. Canopy cover modifications that affect the abundance of insect and seed food sources could also impact pygmy nuthatches.

Alternatives 2 or 3 would remove approximately 13.3 hectares (32.9 acres) of potential habitat for this species, Alternatives 4 or 5 would remove approximately 7.7 hectares (19.0 acres), and Alternative 6 would remove 4.8 hectares(11.3 acres). The project may impact individuals but, because effects to habitat are minor compared to available habitat, is not likely to result in a loss

of species viability in the area or cause a trend to federal listing or a loss of species viability rangewide.

Golden-crowned Kinglet (R2 FS Sensitive; FS MIS)

The golden-crowned kinglet is a fairly common summer resident and rare winter resident in Colorado. They are well-distributed across late–successional spruce-fir habitats within Colorado. This species uses a wide range of habitats including riparian (aspen-willow-alder), spruce, spruce-fir, and lodgepole pine stands. Small numbers of golden-crowned kinglets have been found within the study area.

Impacts to populations of golden-crowned kinglets can include vegetation modification of old growth spruce-fir habitats that reduce canopy closure, remove nesting and foraging structures, and adversely affect insect and arthropod abundance. Alternative 1 will not impact the golden-crowned kinglet since no habitat disturbance will occur. Alternatives 2 or 3 would remove approximately 9.9 hectares (24.4 acres) of late-successional spruce/fir habitat for this species, Alternatives 4 or 5 would remove approximately 5.4 hectares (13.3 acres), and Alternative 6 would remove about 3.34 hectares (8.25 acres). Any build alternative may impact individuals, but none would be likely to result in a loss of viability in he area or cause a trend toward federal listing or loss of species viability rangewide because the species is generally considered an interior forest species, and interior forest is, for the most part, not affected.

Fox Sparrow (R2 FS Sensitive)

The Rocky Mountain form (subspecies) of the fox sparrow (*P. i. schistacea*) is considered to be an uncommon to fairly common resident of the upper montane zone where it occupies riparian shrubland and woodland habitats between 2,285 and 3,350 meters (7,500 and 11,000 feet). They may be found in lower elevations during migration and in the winter months. In general, fox sparrows nest within dense shrubby riparian understories for concealment from predators and refuge from extreme temperatures. This species has been observed in willow, alpine tundra, fir-spruce, spruce, and willow-wet meadow habitats. Based on past survey records, it is assumed that suitable habitat exists within the project area and is occupied by this species.

Alternative 1 will not impact the fox sparrow since no habitat disturbance will occur. Alternatives 2 or 3 would remove approximately 2.0 hectares (4.8 acres) of potential habitat for this species, Alternatives 4 or 5 would remove approximately 1.1 hectares (2.8 acres), and Alternative 6 would remove about 0.21 hectare (0.52 acre). The fox sparrow has little tolerance to changes on nesting grounds, and is probably not nesting close enough to the road to be disturbed by any alternative. Effects also include avoidance of the area due to increases in recreation, access, and overall noise levels within the habitat of this relatively intolerant species.

Construction may impact individuals but, because of the large amount of suitable foraging and nesting habitat in the vicinity, is not likely to result in a loss of viability in the area or cause a trend toward federal listing or loss of species viability rangewide.

Northern Leopard Frog (R2 FS Sensitive; Special-Concern, CO State; FS MIS)

The northern leopard frog is widely distributed in North America, but uncommon and localized in Colorado. Leopard frogs are highly aquatic and occur in or near quiet, permanent and semi-permanent water in many habitats, but particularly those with rooted aquatic vegetation up to

3,200 meters (10,500 feet). Adults may forage far from water in damp meadows and during rainy weather. Searches of ponds and wet meadow habitats north of Guanella Pass conducted by the CDOW during the 1995 boreal toad surveys failed to locate northern leopard frogs. Potential habitat is present for leopard frogs within the study area; however it is unlikely that the species regularly occurs. The effects analysis is based upon the premise that the species may occur in the project area.

Alternative 1 would not disturb potential habitat for the leopard frog except for continued and likely increasing sediment deposition. Alternatives 2 through 6 are not expected to directly impact any potential breeding pond habitat. Increased mortality during dispersal events may occur as a result of increased traffic over time under all alternatives.

Any of the build alternatives may impact individuals, but none are likely to result in a loss of viability in the area or cause a trend toward federal listing or loss of species viability rangewide. Alternatives are unlikely to adversely affect the species due to lack of specimen occurrence in the project area. Mitigation provided for impacts to wetlands should compensate for any indirect hydrologic impacts to potential leopard frog breeding habitat.

Boreal owl (R2 FS Sensitive)

In Colorado, the boreal owl is considered a rare to locally uncommon resident of mature spruce-fir and spruce-fir/lodgepole pine forests interspersed with meadows in areas between 2800 and 3170m (9,200 and 10,400 feet). Preferred habitat in the Rocky Mountain region consists of extensive stands of late successional subalpine forest (mixed conifer, Engelmann spruce, Douglas-fir, and aspen) interspersed with foraging habitat that consists of openings in the canopy and wet meadows.

Several records of boreal owl occurrence have been recorded in the northern Park County and Clear Creek County area. Surveys to assess the presence and distribution of boreal owls in the study area were not conducted for this analysis. It has been presumed that potential habitat exists within the project area and is possibly occupied by boreal owls.

Impacts to boreal owls may include nighttime mortality as a result of collisions with vehicles. However, it has been determined that vehicular travel on Guanella Pass Road after darkness is very low, thus the potential for direct effects to boreal owls as a result of highway mortality is considered unlikely. If boreal owls use the project area, construction disturbance under the build alternatives could result in avoidance of foraging or roosting areas.

Impacts could also include removal of potential nest and roost structures, a reduction in canopy cover, and habitat modifications that lead to the loss of prey species and their habitat. It is doubtful, however, that boreal owls currently nest within adjacent areas of the road considered for expansion/straightening. Alternative 1 will have no impact on boreal owls since no habitat disturbance will occur. Alternatives 2 or 3 would remove 9.4 hectares (23.2 acres) of boreal owl habitat, Alternatives 4 or 5 would remove approximately 6.8 hectares (16.8 acres), and Alternative 6 would remove 4.5 hectares (10.1 acres).

In order to avoid impacts to boreal owls, night-time surveys for boreal owls will be conducted one year prior to construction work in full reconstruction areas in mature conifer habitats. In coordination with the FS, the FHWA will schedule construction activities to avoid impacts.

Porter's Feathergrass (Federal Candidate, R2 FS Sensitive)

Porter's Feathergrass is endemic to central Colorado, located in Lake, Park, and El Paso Counties. Usual habitat is on grassy hummocks on high quality rich fens where sufficient nutrients are present to support a botanically diverse flora. This species had been found on the large fen at the south end of Geneva Park prior to the Guanella Pass survey. During the course of the survey, plants were found in two areas on the fen in Geneva Park.

Alternative 1 will not impact Porter's Feathergrass. Under all of the build alternatives, the road along the south end of Geneva Park is reconstructed or rehabilitated along its present alignment. Unplanned disturbance peripheral to this reconstruction action could cause harm to the feathergrass.

Construction of the proposed alternatives is not a direct threat to Porter's feathergrass. To protect the plant, boundaries will be clearly marked (temporarily fenced during construction) around the surveyed species location. This will be made known to construction personnel, and penalties for transgression will be enforced. This will be done to protect the entire fen area. With implementation of this mitigation, there will be no impact to Porter's feathergrass.

Reflected Moonwort (R2 FS Sensitive)

Several species of moonworts are considered to be rare in Colorado. They do well in mildly disturbed areas below timberline in moist grassy meadows, but also in rather dry, barren areas between the trees. Reflected moonwort was found at several locations along the Guanella Pass Road corridor. Various populations were found along the existing road in the gravelly shoulders on both sides of the pass.

Direct impacts to observed occurrences of moonwort species, including reflected moonwort, would occur for all build alternatives at six locations along the roadside. The association of these plants with disturbed road shoulder sites leaves the likelihood of their periodic destruction rather high even within the confines of normal road maintenance for all alternatives including Alternative 1. Because these plants currently exist along the gravel-laden, recurrently disturbed highway shoulders, it is reasonable to expect that they will also exist along the shoulders of the reconstructed road.

Mitigation of the temporary impact to the moonworts will be accomplished through implementation of a modest transplantation effort. Moonworts will be transplanted to up to six sites in coordination with FS botanists.

Slender Moonwort, Pale Moonwort (R2 FS Sensitive)

Moonworts are spread thinly throughout the higher mountains of Colorado, but because of their small size and lack of showy flowers, these relatives of the ferns are rarely seen. Slender moonwort can occur in a variety of habitats such as meadows with tall grass, beneath trees in wooded areas, and on limestone cliff shelves at higher elevations. The species is currently being reviewed for listing under the ESA. Pale moonwort occurs predominantly on open exposed hillsides, burned or cleared areas, and old mining sites between 2,990 and 3,230 meters (9,800 and 10,600 feet) in elevation.

During the Guanella Pass botanical surveys, moonworts were frequently encountered in roadside habitats above 2,927 meters (9,600 feet). At the time of observation, many plants were immature and could not be conclusively identified to species. Among the mature moonworts, the following four species were encountered: *Botrychium echo*, *Botrychium colorado*, *Botrychium lanceolatum*, and *Botrychium lunaria*. No populations of slender moonwort (*B. lineare*) or pale moonwort (*B. pallidum*) were found during any of the field surveys.

Although the botanical surveys did not positively identify any pale moonwort or slender moonwort, their occurrence along the Guanella Pass Corridor is possible since both species are known to occupy disturbed habitats along roadsides. However, the probability of occurrence is low due to the extreme rarity of both species and the distance of the study area from all known populations. Therefore, although any of the build alternatives may impact individuals, impacts to these two species are not expected, and none of the alternatives would lead to the listing of either species as endangered or threatened.

Northern Blackberry (R2 FS Sensitive)

Another fen species, this small blackberry has been collected twice in the large fen in Geneva Park. It is a species of the far north, common in Alaska, but rarely seen in Colorado. This plant hugs the ground on grassy hummocks among the willows, making it difficult to see. It rarely blooms or sets fruit in Colorado, although a few plants were seen in flower in 1994 and 1995. A single plant was found in fruit in 1996. Thousands of these plants exist in the southern part of the Geneva Park fen.

Under all of the build alternatives, the road along the south end of Geneva Park is reconstructed or rehabilitated along its present alignment. Unplanned disturbance peripheral to this reconstruction action could cause harm to the blackberry.

The proposed alternatives are not a direct threat to the blackberry. To protect the plant, boundaries will be clearly marked (temporarily fenced during construction) around the surveyed species location. This will be made known to the construction personnel, and penalties for transgression will be enforced. This will be done to protect the entire fen area. With implementation of this mitigation, there will be no impact to Northern blackberry.

Summary of Effects to Threatened, Endangered, and Sensitive Species

The BA states that all build alternatives may adversely affect the Canada lynx. No other federally listed threatened or endangered species would be adversely affected under any of the alternatives considered. The BA and BR also state that adverse impacts are not likely to the boreal western toad (a candidate species for listing under the ESA) from any of the build alternatives. The BR states that any adverse impacts occurring to FS sensitive species, for any of the alternatives considered, should not result in a trend toward listing under the ESA.

5c. Management Indicator Species

Affected Environment

The NF Management Act and FS Handbooks direct the FS to preserve and enhance plant and animal diversity consistent with overall multiple use objectives in order to maintain viability of all native and desirable non-native species in the NF. The 1997 revision of the *Land and*

Resource Management Plan for the Arapaho and Roosevelt National Forests and the 1984 *Land and Resource Management Plan of the Pike and San Isabel National Forests* define a series of habitat types and respective MIS for use in analysis of project effects on species and habitat. The affected environment is the same as for General Wildlife.

Environmental Consequences

The analysis of potential impacts to MIS included review of literature, maps, aerial photography, and databases; contacts with species experts to augment published information and database records of species occurrence; and field surveys during 1995-1996 to assess habitat conditions and the status (presence/absence) of MIS and TES species.

Current and projected future habitat conditions along Guanella Pass Road were considered in the evaluation of potential direct and indirect impacts to wildlife that could result from construction of proposed road improvements, increased traffic, and increased recreational use of NF Lands accessed from Guanella Pass Road. The following MIS were evaluated in the *Biological Report, Guanella Pass Road* (2002):

- white-tailed ptarmigan (*Lagopus leucurus*)
- American pipit (*Anthus rubescens*)
- green-tailed towhee (*Pipilo chlorurus*)
- warbling vireo (*Vireo gilvus*)
- MacGillivaray's warbler (*Oporornis tolmiei*)
- Wilson's warbler (*Wilsonia pusilla*)
- white-crowned sparrow (*Zonotrichia leucophrys*)
- beaver (*Castor canadensis*)
- showshoe hare (*Lepus americanus*)
- Rocky Mountain bighorn sheep (*Ovis canadensis*)
- Rocky Mountain elk (*Cervus elaphus*)
- mule deer (*Odocoileus hemionus*)
- rainbow trout (*Oncorhynchus mykiss*)
- brook trout (*Salvelinus fontinalis*)
- pygmy nuthatch (*Sitta pygmaea*)
- golden-crowned kinglet (*Regulus satrapa*)
- Townsend's big-eared bat (*Plecotus townsendii*

Most of the identified impacts are either due to direct removal of habitat, or are related to increased traffic speed and volume. Higher speeds and volumes increase the potential for direct mortality. As use of the road increases with regional population growth, the potential increases for disturbance of wildlife and wildlife habitats by recreationists during critical periods (nesting, lambing, wintering). These effects would be greater under Alternatives 2 or 3 than under Alternatives 4 or 5, and less under Alternative 6, and least under Alternative 1.

Increased potential for direct mortality due to increased traffic and speed was identified for green-tailed towhee, warbling vireo, MacGillivaray's warbler, white-crowned sparrow, and Wilson's warbler. However, effects are expected to be minor or negligible for each of these species. Secondary effects from off-road recreation use were identified for the white-tailed ptarmigan and American pipit. Habitat loss was identified as an impact for the warbling vireo, pygmy nuthatch, and golden-crowned kinglet. All alternatives would increase the potential for roadkill of elk, mule deer, bighorn sheep, and snowshoe hare due to greater traffic volume and higher speeds. None of these effects are expected to reduce the viability of these species or have a substantial adverse impact on the communities that they inhabit.

The West Guanella Pass study area includes scattered willows and encroaches on thicker willows that provide winter habitat for the white-tailed ptarmigan population at Guanella Pass. The white-tailed ptarmigan is an FS MIS. Construction of the parking lot would result in direct loss of winter habitat, and would likely result in a shift in distribution of wintering ptarmigan if the parking lot is used in the winter. The new lot on the west side, located over 275 meters (900 feet) to the west of the existing parking area, will encourage more over-the-snow recreation to the west, north, and south of the parking lot. On an average summer weekend day, it is estimated that the increased use of the area may cause wintering ptarmigan to abandon approximately 2.8 hectares (6.9 acres) of habitat adjacent to the proposed parking lot and trail corridors. As noted in the lynx section above, increased recreation use in this area could also affect the lynx.

Elk and mule deer can be expected to cross the road at essentially any point during late spring through fall. Under all of the build alternatives, increased traffic and vehicle speeds would increase the potential for roadkill of these species. However, the increased site distance allowed by the build alternatives will aid in the avoidance of wildlife on the road. None of the alternatives would result in removal of habitat identified as seasonally important to elk or mule deer. Based on the presence and current levels of use of the existing road, the overall seasonal distribution and movements of elk and mule deer within the area of consideration are not expected to be substantially altered by any of the build alternatives.

The Mount Evans-Grant bighorn sheep herd occupies the area south of I-70, east of Guanella Pass Road, and north of US Highway 285. Under all build alternatives, increased traffic and vehicle speeds may alter current patterns of bighorn sheep range use and increase direct mortality. Sheep, which are currently drawn to magnesium chloride deposits which accumulate as a result of dust control efforts on the road, will continue to visit the road corridor. Increased traffic may affect use of a historic bighorn sheep lambing area west of the road in the Arrowhead Mountain-Threemile Gulch area. Sheep that use areas adjacent to the road may also be subjected to increased harassment by humans who leave their vehicles to take close-up photographs, and dogs off leash. Sheep that use the road in the vicinity of Duck Creek and the west-facing slope above Lower Cabin Creek Reservoir will be subjected to increased mortality and harassment by humans and dogs off leash. Recent population estimates suggest that the bighorn population in the Guanella Pass area is increasing and expanding its range. This information suggests that under current conditions, the project will not jeopardize the viability of the mount Evans-Grant herd.

No long-term negative impacts to aquatic MIS or aquatic habitats within the road corridor are expected under any build alternative. Each of the build alternatives involves removal of the culverts that exist at nine locations where the existing road crosses South Clear Creek, Duck Creek, and Geneva Creek. Two stream crossings are eliminated and seven of the existing round

culverts are replaced with natural bottom arch culverts and natural streambed substrate that permit passage of aquatic biota under the road. Long-term habitat benefits are expected to result from reduction of sediment runoff (see **Chapter III.B.2a: Water Quality**).

Habitat Complexes

Effects to twelve different types of habitat complexes were also evaluated in the *Biological Report, Guanella Pass Road* (2002). Mapping has not been completed for the Pike-San Isabel NF, so estimates of the areas of affected habitat complexes considered only the Arapaho-Roosevelt NF.

None of the alternatives would affect the "Snags and Coarse Woody Down and Dead", "Effective", or "Interior" habitat complexes. In addition, Alternative 6 would have no effect on "Lodgepole Pine" or "Old-growth Forest". In all cases except where impacts were the same, Alternatives 2 and 3 would have more impact than Alternatives 4 and 5, which would have more impact than Alternative 6.

The coarse colluvial slope below the Weber monkeyflower cliff that will be affected by any of the construction alternatives is an example of a community listed by the FS as an environmental element to be protected. In addition to constituting an MIS community, this area includes a population of Rocky Mountain columbine, which is a rare Colorado endemic species. The Duck Lake Materials Source Area includes an even larger population of Rocky Mountain Columbine that occurs in a community located on a landslide that has been stabilized by development of alpine tundra vegetation.

5d. Colorado Natural Heritage Program Species

Forty-nine plants classified as sensitive by the CNHP were evaluated in the *Guanella Pass Road, Colorado Forest Highway 80, Biological Assessment/Biological Evaluation* (April 1998). Although these species have no legal protection, they are considered rare and imperiled within Colorado.

Four CNHP species of moonwort that tend to grow in disturbed areas such as gravelly road shoulders may be affected; however, they should continue to exist along the reconstructed road shoulders. It was also found that any of the build alternatives might affect tall fleabane, black-headed daisy, pinnate fleabane, and northern twayblade. The few plants that might be removed by construction of any of the alternatives will not cause a trend toward listing as endangered or threatened by the USFWS. The coarse colluvial slope below the Weber monkeyflower cliff includes a population of Rocky Mountain columbine, which is a rare endemic Colorado species. The Duck Lake Materials Source Area includes an even larger population of this species which would be affected by all build alternatives. Mitigation for adverse effects will include a transplantation effort in coordination with FS botanists.

5e. Parking Area Impacts on Plants and Animals

Affected Environment

Three parking areas and their access roads along Guanella Pass Road were individually assessed for potential habitat for threatened, endangered, and sensitive plant and animal species. Other parking areas were included in the corridor analysis. Documentation for the assessments are

included in *Guanella Pass Road Colorado Highway 80 Parking Lots Biological Survey and Wetland Delineation* (ERO Resources Corporation, September 2002).

The proposed parking lots are designated Abyss, Duck Creek, and West Guanella Pass. Because the fieldwork was done in mid-September of 2001, most of the plant species were past their optimal survey windows. Therefore, the study areas were assessed for the presence of potential habitat rather than the presence of populations or individuals. The sites were thoroughly covered by a pedestrian survey in the event that late bloomers or species with distinctive vegetative characteristics were visible. Additional surveys will be performed in the spring of 2002 to ensure that no occurrences were overlooked.

Environmental Consequences

No individuals or populations of TES species were found during the single pedestrian survey of each study area. Given the context and the scope of the overall project, the addition of these small study areas to the larger study area does not change the determination of impacts to species provided in the BR.

The West Guanella Pass parking study area is located in alpine turf, an FS MIS plant community. Construction of the parking lot would impact about 0.9 hectare (2.2 acres) of this community type. Although the area of impact is relatively low, because this community type is extremely difficult to restore or create, in practical terms, the affected vegetation in the area of impact would be a permanent loss.

5f. Fisheries

Affected Environment

The Guanella Pass Road generally parallels streams of the Geneva Creek drainage from Grant north to the summit of Guanella Pass. From Guanella Pass, the road parallels South Clear Creek to Georgetown. Duck Creek, a Geneva Creek tributary, flows from Duck Lake, an artificial impoundment, which collects water from wetlands just below the summit of Guanella Pass and Square Top Lakes. After flowing southward about six kilometers (four miles), Duck Creek joins Geneva Creek. From Geneva Creek's confluence with Duck Creek to its joining the North Fork of the South Platte River at Grant, flows of Geneva Creek are augmented by several tributaries, including Bruno Gulch and Scott Gomer Creek.

South Clear Creek originates from wetlands and small lakes just below Guanella Pass and flows northward to its confluence with Clear Creek. About three kilometers (two miles) from its sources, South Clear Creek is joined by Naylor Creek. Leavenworth Creek, the only other major tributary of South Clear Creek, enters South Clear Creek about three kilometers (two miles) upstream of Georgetown. Both South Clear Creek and Duck Creek begin at elevations exceeding 3,500 meters (11,400 feet), and Geneva and South Clear Creeks end near 2,590 meters (8,500 feet).

South Clear Creek supports brook, brown, and rainbow trout. Brook trout is the most common and widespread of the species in South Clear Creek. Geneva Creek (downstream of the Scott Gomer Creek confluence) also supports a mixed community of rainbow, brown, and possibly brook trout.

Existing quality of streams within the project area and their resultant capabilities to support fish communities can be broadly separated into those reaches affected by acid-sulfate weathering processes occurring in their watersheds, and those reaches that are not. Geneva Creek throughout most of its length is considered impacted by acid-sulfate weathering. Leavenworth Creek, a South Clear Creek tributary, has also been affected by mining activities high in its watershed and the acid-sulfate weathering process. Characteristics of streams affected by such weathering are low pH and high amounts of sulfate, iron, copper, lead, zinc, and other trace elements either dissolved in the water or attached to suspended sediments. Dissolved trace elements are considered more available to aquatic plants and animals than their particulate forms. These trace elements are carried to streams in sediment runoff.

Substantial runoff within the project area occurs primarily during snowmelt when dilution by higher flows reduces concentrations of elements. A runoff pulse initiated by rapidly warming spring temperatures or rainfall onto snow sometimes push the sediment laden water through the high gradient system in a relatively short period of time. This runoff period of May through July precedes the autumn spawning period of brook trout but may affect rainbow trout. The highest sediment loads are carried on the rising limb of runoff flushing through the system during spring, the spawning period of rainbow trout. Depending upon the temperature-triggered time of rainbow trout spawning, the size of particles in suspension, and the location of spawning gravels relative to points of sediment introduction, reproductive success of the rainbow trout may be affected.

The particle size of sediment introduced to the stream also affects the ultimate availability of trace elements. The finer the particulate, the farther downstream it is carried and the longer it stays in suspension. The sediment eroding from the existing road is primarily composed of fine particles, increasing the likelihood that the particle will be transported downstream to a reach of low velocity before settling. Base materials in both drainages are mainly gravel, cobble, and boulders. Sand and pea gravel are common in low gradient reaches and where water velocity was slow (e.g., pools and eddys). Silt is predominant in beaver ponds, which are common in upper reaches of South Clear Creek. A detailed inventory is provided in *Fisheries Assessment for the Proposed Guanella Pass Road Improvement Project* (Western Consulting Group, February 2002).

Environmental Consequences

Since impacts to fisheries are tied directly to water quality issues, much of the detailed information supporting conclusions in the Fisheries section is contained in **Chapter III.B.2a: Water Quality**.

The conditions resulting from acid-sulfate weathering in the affected reaches of Geneva Creek and Leavenworth Creek are considered to be dominant influences on the aquatic communities of those sites regardless of any alternative implemented. The water quality (pH, high trace elements) and resultant habitat quality (low abundance and diversity of prey items) that are considered to be limiting to trout persistence in these stream reaches most likely pre-existed the initial construction of the road 50 years ago and are not likely to be made either better or worse by its continued use as it is, or following any planned rehabilitation or reconstruction.

Alternative 1

Alternative 1 would produce no short-term impacts; however, it would also provide none of the long-term benefits from the sediment reduction measures that would be included, in varying degrees, in the other alternatives.

Alternatives 2-6

Fish are impacted by sediment loads, which affect spawning and nursery habitats and the availability of prey. Under Alternatives 2-6, there will be temporary impacts (particularly sediment loading) to fish habitat during road rehabilitation and reconstruction activities. This will be localized and minimized by appropriate sediment control measures. The relative impact of such work, and its duration, would vary with type of activity, distance from stream, and measures taken to mitigate impacts. These impacts may temporarily reduce trout abundance, but following completion of work and stabilization of disturbed areas, trout numbers can be anticipated to return or increase to at least pre-disturbance levels due to permanent erosion control measures. Hardening of the road surfacing, addition of road drainage culverts, slope stabilization, replacement of existing stream crossings with natural-bottom culverts, and stabilization of stream banks would contribute to improvement of trout habitat.

The long-term effects of Alternatives 2-6 on fisheries are related to the amount of sedimentation that would enter streams from the roadway. As discussed in **Chapter III.B.2a: Water Quality**, the majority of sediment from an unpaved road comes from the surfacing. The least amount of surface sediment would come from Alternative 2, paving the entire road. Alternative 6 would harden 86 percent of the road surface (56 percent pavement and 30 percent macadam), and Alternatives 4 and 5 would be close behind with about 86 percent pavement. Alternative 3 would pave 48 percent.

The report *Sedimentation Problems Identified on the Guanella Pass Road, Aquatic and Soil Resource Recommendations* (FS, October 25, 2001) identifies problem areas along the Guanella Pass Road and prioritizes them for improvement. Any of the build alternatives would focus on improving areas identified as having priority 1 or 2 in the report; however, the ability to perform improvements is dependent upon the type of construction proposed for any specific area. Alternatives 2 and 3 would provide the greatest opportunity to repair existing erosion problems because they have the most full reconstruction, followed by Alternative 5, then 6. Alternative 4 provides the least opportunity of the build alternatives because large sections of the road are left alone, and Alternative 1 provides the least amount of opportunity to reduce sediment runoff. As with water quality, long-term benefits to fisheries are expected for any of the build alternatives.

All rehabilitation and reconstruction alternatives for Guanella Pass Road would have some short-term negative impact on existing trout habitats in the Geneva and South Clear Creek drainages due to erosion of new slopes before vegetation becomes established. Alternatives 2-5 would have greater impact than Alternative 6, and all build alternatives would have more impact than Alternative 1 (No Action).

6. Construction Impacts

6a. General Construction

During the construction season for any of the build alternatives, trucks and other vehicles will pass through Grant and Georgetown carrying materials and construction workers. This will result in increased noise, air pollution, and traffic in Grant and Georgetown.

Construction of cuts and fills removes vegetation and disturbs soils, intensifying the effects of natural erosion. Before cuts and fills revegetate, increased sedimentation from erosion can be expected. Road construction generally increases sediment yield in the first few years before cut and fill slopes revegetate. Chronic inputs of sediment into stream systems from slopes that do not revegetate can have a detrimental effect on aquatic organisms. BMPs for erosion control will be used to reduce sediment transport.

Construction activities will temporarily impact air quality and wildlife. Dust particles stirred up during construction and vehicle emissions from construction equipment and delayed vehicles will temporarily affect localized air quality. Construction dust will be reduced by spraying the construction area with water. Wildlife in the immediate vicinity may be affected by the increased noise and activity during construction operations. Selective siting and timing of construction operations will help reduce impacts to wildlife in some sensitive areas, such as nesting sites.

There could be spills or leaks of chemical substances from construction equipment. Restrictions on construction operations make it unlikely that they would occur directly into streams. It is more likely that if spills were to occur it would be on soils nearby and the substance would migrate into streams or groundwater. In the event of an accidental spill, the project specifications require the contractor to implement containment measures immediately and notify the appropriate authorities.

Construction will discourage recreation use of the Guanella Pass area near the construction activities. Construction related impacts such as noise, dust, visual impacts, and traffic delays will make the construction zones less appealing to visitors. Construction activities are not compatible with the "get away from it all" desires of many recreationists. However, construction will be performed in limited areas in any given year so most of the route will be relatively unaffected.

Small landslides occur occasionally during construction and sometimes on newly constructed roadways. Most of these landslides are very minor and are repaired without major adverse affects. Occasionally, a major landslide that has severe adverse environmental impacts occurs. Some risk is always involved in earthmoving activities, but it is a major design goal to ensure that those risks are minimized both during and after construction. No major instabilities are known that might be affected by the build alternatives.

6b. Construction Cost

Table III-19 shows the estimated construction cost for each alternative. The construction costs shown in the table are for construction contracts only, and do not include preliminary engineering, environmental analysis, mitigation, ROW, utilities, and construction administration, which typically all total about 30 percent or more of the construction contract. These are

conceptual costs for comparison of the alternatives, based on preliminary design, and will change during final design. The cost estimates include earthwork, wall quantities, paving quantities, guard rail, clearing and grubbing, revegetation, drainage, traffic control, and erosion control. The construction cost for Alternative 6 is less than Alternatives 2-5, though comparable to Alternative 4. This is because Alternative 6 has 37 percent reconstruction (18 percent of which is light reconstruction) and 63 percent rehabilitation, whereas Alternative 4 has 51 percent reconstruction and 49 percent no action. The estimate is less than the cost for Alternatives 2, 3, and 5 because of the increased amount of rehabilitation (and decreased amount of reconstruction) associated with Alternative 6.

The cost of reconstruction of the roadway will be paid for using Forest Highway Funds. Typically the road management agencies are responsible for acquiring any needed additional ROW. The counties and town will continue to be responsible for the cost of road maintenance. See **Chapter III.C.11: Maintenance Cost** for information on maintenance costs.

Table III-19
Total Estimated Construction Cost for each Alternative
($ Million – 2002 Dollars)

Alternative	Total Construction Cost
Alternative 1: No Action	$0.0
Alternative 2: Reconstruct and Pave	$46.1
Alternative 3: Reconstruct to Existing Surface Type	$44.6
Alternative 4: Partially Reconstruct and Pave	$29.2
Alternative 5: Partially Reconstruct/Partially Rehabilitate	$35.9
Alternative 6: Preferred Alternative	$28.9
Source: *Guanella Pass Road Preliminary Cost Estimates & Alternative Cost Comparison Report, April 1996*[5].	

6c. Hauling

It is estimated that Alternatives 2 and 3 would require 5 years to construct and Alternatives 4, 5, and 6 would required 4 years to construct. At higher elevations, construction under any of the alternatives will take place between May and October depending upon the weather. The construction season may be extended about two months from April to November at lower elevations, such as in the Towns of Georgetown and Grant. The number of days required to construct a certain section of the road is dependent on the type of construction (full reconstruction, light reconstruction, and rehabilitation) and the type of surface to be constructed. In general, full reconstruction takes longer than light reconstruction or rehabilitation and a paved surface takes longer than a gravel surface.

Construction is scheduled to begin at the higher elevations and move to lower elevations toward Grant or the Town of Georgetown. This minimizes material from being hauled over newly constructed or rehabilitated areas. All material removed from the existing road during construction is recycled and used in the project.

The FHWA proposes to obtain all aggregate material for constructing the aggregate base, hot asphalt concrete pavement and select backfill for the majority of project from the Duck Lake and

[5] Construction cost data was converted from year 1996 dollars to year 2002 dollars based on the Consumer Price Index for Urban Consumers increase over that time period.

Geneva Ski Basin parking area material source sites. Aggregate material for the portion of the road from station 1+000 to station 7+000 would be hauled in through Grant. All other materials (culvert pipes, guardrail, etc.) required for constructing the portion of the road found in Park County would be hauled in through Grant. All other materials required for constructing the portion of the road found in Clear Creek County would be hauled in through the Town of Georgetown.

Based on preliminary designs for Alternatives 2-6, the estimated number of truckloads required to haul in the needed materials for each alternative is found in Table III-20. This estimate is based on the assumption that there is sufficient aggregate at Duck Lake and the Geneva Ski Basin parking area for the portion of the road extending from 7+000 to 39+000 for all alternatives.

Table III-20
Estimated Construction Truck Trips Required to Build Each Alternative
(Round Trips)

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
Through Grant	0	1310	1270	830	1020	820
Through Georgetown	0	3210	3110	2030	2500	2010

The above number of truck trips are preliminary and subject to change as the project progresses through final design. The types of trucks considered in this estimate are 18-wheelers and concrete trucks. If smaller trucks are used then more truck trips would be required than what is presented in Table III-20. The estimated truck trips would be irregularly dispersed throughout the project construction period. On some days there will be practically no construction truck traffic traveling through Grant or Georgetown. On other days when certain construction activities are taking place, such as construction of retaining walls, construction traffic through these communities will be more frequent.

In the Town of Georgetown, the FHWA has considered a number of haul routes in an attempt to minimize the impacts of construction hauling on the community. These haul routes include:

- Argentine Street to Second Street. The advantage of using the Argentine Street route is that it routes traffic away from the school and businesses. The disadvantage of this route is that 18-wheelers are unable to negotiate the corners and oncoming traffic would need to be stopped with flaggers.

- Rose Street to Second Street. The advantage of using this route is that it accommodates 18-wheelers. The disadvantage of this route is that it routes the traffic past the school and businesses.

- Bypass of Georgetown using a temporary bridge (for construction traffic only) over Clear Creek east of the Loop Railroad's high bridge. The advantage of this route is that the majority of trucks hauling materials would not interfere with the Town of Georgetown streets. The trucks would follow a route up Loop Road to the bypass bridge that would

connect to the second switchback above Georgetown. The disadvantage is that the route would require a temporary easement over private property, which may not be feasible to obtain. In addition, truck traffic may interfere with tourist traffic to the Georgetown Loop Railroad and the route would impact a historic site.

- The Town of Georgetown requested the FHWA to consider a fourth alternative haul route. This route would require the construction of a permanent bridge over Clear Creek on Seventh Street between Brownell and Argentine Streets (Figure III-21). Construction traffic would turn off Brownell Street onto 7th Street and then 18-wheelers would turn onto Rose Street and smaller truck traffic would turn onto Argentine Street. The advantages of this haul route are that it distributes truck traffic among two routes and the construction of the new bridge over Clear Creek would assist the Town of Georgetown in its future traffic management needs. A disadvantage is that truck traffic would still go past businesses and the school. However, this truck traffic would be reduced in numbers because some of the truck traffic would be traveling up Argentine Street. Another disadvantage is that some private ROW may need to be acquired for the construction of the bridge. The FHWA is currently pursuing the implementation of this haul route option.

To minimize impacts to the communities in both Clear Creek and Park Counties, the contractor's hauling activities will be limited as much as possible to times that will be the least disruptive to businesses and residents along the haul route. A list of commitments can be found in **Chapter IV.I.2: Hauling.**

6d. Materials Source Locations and Staging Areas

Roadway design will attempt to balance the material taken from cuts with the amount used in fills. Where this is not possible, borrow material will be obtained from sites near the construction areas.

The materials source locations along the roadway are being identified as mitigation for truck hauling in Park County and Clear Creek County. Preliminary testing has indicated that two sites in the project corridor are suitable for use as materials sources.

The first site is near Duck Lake just south of Guanella Pass at station 19+200 on the east side of Guanella Pass Road. This location was probably used as the materials source for the construction of the Geneva Basin Ski Area parking lot and access road. Initial testing of the material on the Duck Lake site has indicated that it is suitable for use as a road base and surface course for either a paved or gravel road.

There will be increased noise, dust, and traffic in the vicinity of the Duck Lake borrow site when material is being processed. The contractor will probably want to reduce costs by performing all of the quarry work needed for the route in one construction season, which would likely require work at the site from June through October.

The second site is the Geneva Basin Ski Area parking lot. The access road to the site is located at station 18+250. Because of its location, size, and layout, this site can be used for more than just a materials source. The site has the potential to be used as a staging area for equipment and for a hot-mix asphalt plant. Like the Duck Lake site, initial testing of the material has indicated that it is suitable for use as a road base and surface course for either a paved or gravel road.

B E F O R E

Figure III-21
Permanent Hauling Bridge on 7th Street Between Brownell and Argentine
In Georgetown

A F T E R

Environmental impacts were evaluated at each of these sites and the impacts will not pose any threat to the environment. The Duck Lake site would be restored in accordance with a plan prepared by the FS. The Geneva Basin Ski Area parking lot is a proposed wetland mitigation site.

6e. Construction Noise

Noise from construction equipment and operations will possibly impact the residents of Georgetown and Grant, as well as hikers, campers, and tourists in the vicinity of Guanella Pass Road. Impacts will vary depending on the operations taking place and the location of construction during that time. Possible mitigation techniques to control noise during construction include restricting noisy construction operations to specific times of the day and specific days of the year and requiring adequate mufflers on all equipment. These measures help eliminate construction noise during sensitive nighttime and early morning hours, and minimize it at other times.

To determine the impacts that the construction noise will have on area residents and tourists, nine representative noise analysis locations were chosen (see Figure III-22) based on their level of use. Daytime and nighttime existing noise levels were measured at each site to provide background noise values, listed in Table III-21. Construction noise was modeled using software based on *International Standards Organization (ISO) Standard 9613-2, Acoustics – Attenuation of Sound During Propagation Outdoors*. The model was used to predict the impacts at each analysis location of the loudest and closest stage of construction to occur during implementation of the Preferred Alternative. The model also incorporated the noise from the two material source sites (Duck Lake and Geneva Basin). The model produced a 'worst case' noise value, since the loudest construction phase decibel values were input and the model assumed ideal downwind sound propagation from the source to the receptor. In contrast, a 20 to 30 dB reduction in noise levels can be seen when the wind is blowing from the receptor in the direction of the source. The modeled noise data is presented in Table III-22.

Table III-21
Background Noise Levels Along Guanella Pass Road

Site No.	Site Description	Background Noise – dB(A)	
		Daytime	Nighttime
1	Guanella Pass Campground	44	43
2	Summit	35	23
3	Grant, 0.4 kilometer (0.25 mile) from 285	54	*
4	Burning Bear Campground	37	28
5	Grant, Next to Cindy's Bar	63	52
6	Georgetown, Base of Guanella Pass Road	53	48
7	Clear Lake Campground	38	*
8	Geneva Creek Picnic Area	58	*
9	Tumbling River Ranch	45	*

* Insufficient data collected for meaningful results.

Table III-22
Predicted Construction Noise Levels Along Guanella Pass Road

Site No.	Site Description	Closest Construction Activity – meters (feet)	Predicted Noise Levels – dB(A) Maximum Construction Noise*
1	Guanella Pass Campground	114 (375)	69
2	Summit	53 (175)	74
3	Grant, 0.25 mile from 285	53 (175)	74
4	Burning Bear Campground	53 (175)	74
5	Grant, Next to Cindy's Bar	53 (175)	74
6	Georgetown, Base of Guanella Pass Rd	15 (50)	88
7	Clear Lake Campground	56 (185)	75
8	Geneva Creek Picnic Area	56 (185)	69
9	Tumbling River Ranch	56 (185)	69

* Maximum construction noise at each site is assumed to occur during the period of closest construction activity.

The predicted construction noise levels were compared to the background values to determine their potential audibility. The audibility of an intruding sound in the presence of background sounds is difficult to quantify. In general, audibility depends on the loudness of the intruding sound relative to the background, the frequency content of the sound, and the intermittence of the sound. For this study, a simplification has been made to allow for easy categorization of the construction noise in terms of its audibility. The categories are as follows:

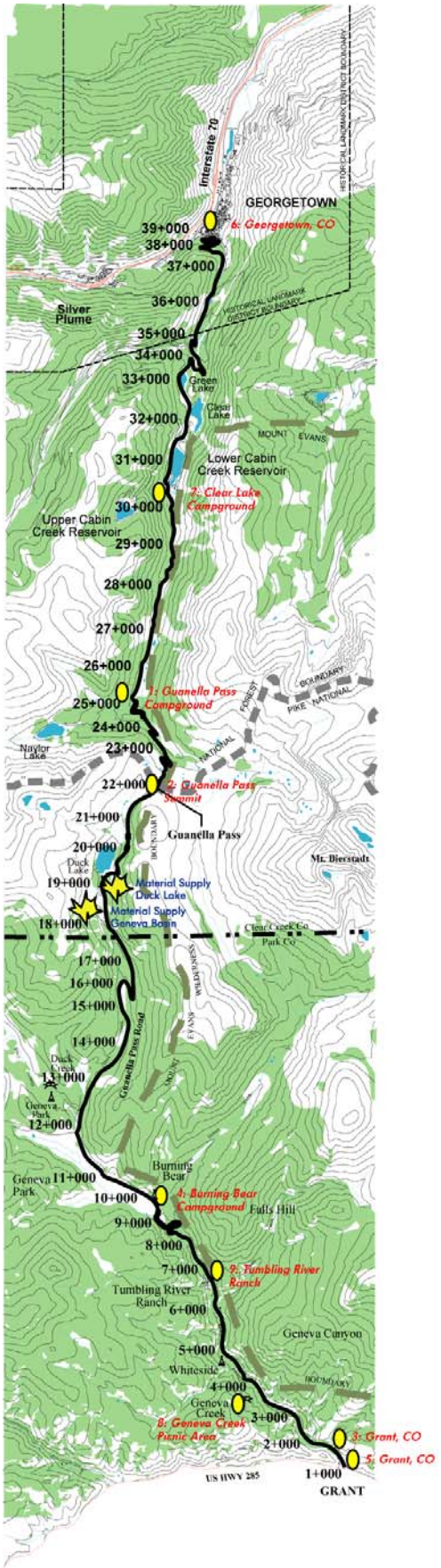
1. Construction noise is considered "never audible" when its predicted noise level is 20 dB or more lower than the background noise level, or is under 10 dB(A)[6]

2. Construction noise is considered "sometimes audible" when its predicted noise level is between 10 and 20 dB less than the background noise level, or is under 20 dB(A)

3. Construction noise is "always audible" when its predicted noise level is between 0 and 10 dB less than the background noise level

4. Construction noise is "very audible" when its predicted noise level is greater than the background noise level

[6] The units dB(A) indicate A-weighted noise levels, which are sounds measured with similar sensitivity to frequency as the average human ear.



Legend

- Noise Sensitive Site
- Primary Blasting Location
- Georgetown-Silver Plume National Historical Landmark District Boundary
- Mount Evans Wilderness Boundary
- Pike-San Isabel/ Arapaho-Roosevelt National Forest Boundary
- Picnic Area
- Campground

N

0 1500 3000 6000 meters

Approximate Scale
1: 120,000
1" = 10,000'

Contour Interval
12 meters (40 feet)

Figure III-22
Noise Analysis Locations

According to the background and predicted noise data, the heavy equipment construction noise is "very audible" at each site when closest to the site. Audibility diminishes as the construction activity moves further away from the analysis location and the noise is attenuated. Figure III-23 illustrates the diminished audibility of the loudest-phase construction activities at several of the noise analysis locations as the construction activities move away from the sites. Though all analysis locations are not depicted in the figure, it was noted that the construction noise attenuation rates of Clear Lake Campground (site 7) closely matched those of the Summit (site 2), and the construction noise attenuation rates of Grant (site 3) closely matched those of Geneva Creek Picnic Area (site 8).

In addition to the heavy equipment noise, the construction activities will produce noise caused by blasting at the two materials source locations (Duck Lake and Geneva Basin)[7]. The blasting sounds are of a very low frequency and vary in intensity depending on the amount of explosive used per blast. The blasting noise levels were simulated based on methodology developed by the U.S. Bureau of Mines (*Report of Investigation 8485, Structural Response and Damage Produced by Airblast,* 1980). For the simulations, a high-end blast noise value was assumed (charge per delay of 3,447 kilograms (7,600 lbs)). Due to the low frequency of the sound waves produced by blasting (<20 Hz), and the ability of low frequency waves to bypass obstacles, no barriers were used in the model. The results of the blasting noise simulations for each of the nine sites are given in Table III-23. For comparison with site background levels, the blasting dB(A) values are given, though presently the correlation to human perception of low-frequency sounds is not well understood. While the blast noise levels exceed most background noise levels, the noise is low-frequency and non-repetitive. Such noises are typically not annoying to humans.

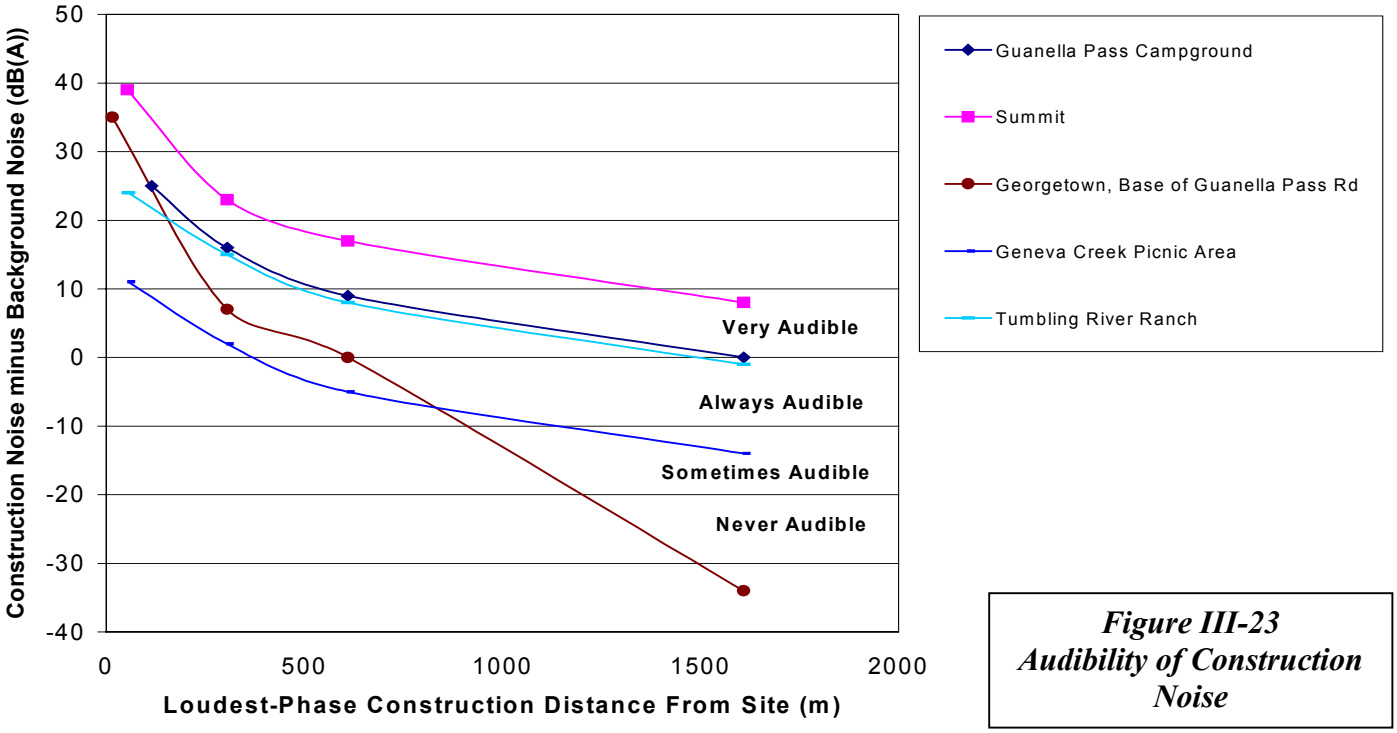


Figure III-23
Audibility of Construction Noise

[7] Material from Geneva Basin is anticipated to be removed without the use of blasting. Noise analysis assumed blasting at Geneva Basin as a worst case condition.

Construction activities will also result in noise due to the use of Occupational Safety and Health Administration (OSHA)-mandated equipment backup alarms. These alarms are used to alert workers to the dangers present when heavy equipment is backing up and operator vision is limited. The high frequency (approx. 1250 Hz) and intermittent nature of these alarms tend to increase their perception by humans. The backup alarm noise was modeled, without foliage or barriers (worst case), at various distances (see Table III-24). Backup alarm noise is predicted to be 36 dB(A) at a distance of 3.2 kilometers (2 miles). Therefore, when construction is within two miles of a receiver location, the backup alarms are likely to be audible at that location. High frequency sounds are sensitive to atmospheric conditions such as wind direction and humidity. The modeled noise levels assume that wind is blowing from the source to the receiver; under other wind conditions, the noise levels could be as much as 25 dB lower.

Table III-23
Construction Blasting Noise Simulations

Site Number	Site Description	Blasting At Duck Lake		Blasting At Geneva Basin	
		Distance to Site – meters (feet)	dB(A)	Distance to Site – meters (feet)	dB(A)
1	Guanella Pass Campground	4,115 (13,500)	40	4,877 (16,000)	39
2	Summit	2,438 (8,000)	45	3,048 (10,000)	43
3	Grant, 0.25 mile from 285	14,021(46,000)	30	13,106 (43,000)	30
4	Burning Bear Campground	7,010 (23,000)	36	6,248 (20,500)	37
5	Grant, Next to Cindy's Bar	14,021 (46,000)	30	13,106 (43,000)	30
6	Georgetown, Base of Guanella Pass Rd	14,325 (47000)	31	15,239 (50,000)	38
7	Clear Lake Campground	8,534 (28,000)	34	9,449 (31,000)	33
8	Geneva Creek Picnic Area	11,887 (39,000)	31	10,973 (36,000)	32
9	Tumbling River Ranch	9,296 (30,500)	33	8,534 (28,000)	34

Table III-24
Back-Up Noise Alarm Modeling

Distance - meters (feet)	Backup Alarm Noise Level (dB(A))
152 (500)	68
305 (1,000)	61
610 (2,000)	55
1,609 (5,280)	45
3,218 (10,560)	36

Effects from construction noise can be expected to be of greater duration for alternatives that include more construction. Alternatives 2 and 3 would have the most effect, then Alternative 5,

then 6, and the least with Alternative 4, which includes 49 percent no action. Potential construction noise effects to wildlife are considered in the specific sections dealing with wildlife.

6f. Vibration

A nondestructive testing investigation was conducted at historic structures in Georgetown to measure the effect that construction traffic might have on the historic buildings within the town during the proposed future construction of Guanella Pass Road. During construction of the surfacing test strips in June and July of 2001, the Vibration Measurement method was used to measure the vibrations at the properties caused by passing10-wheeler trucks loaded with paving materials and construction equipment.

A conservative standard developed by the Swiss Association of Standardization was used to determine potential impacts. For historic masonry structures, this standard recommends that peak particle velocity be less than 3 mm/s (0.12 in/s) for frequencies between 10-30 Hz. For higher frequencies, the standard allows peak particle velocity up to 5 mm/s (0.20 in/s).

Vibration data was gathered from eight locations as shown in Table III-25. The maximum vibration measured during truck activity occurred at the back of the Hamill House, located 10.7 meters (35 feet) from the street. Although this measurement was taken during truck activity, it may not have been caused by a truck. Lawn maintenance was occurring near the seismograph and may have been responsible for this reading. Also, since this vibration occurred at a high frequency, it falls below the Swiss standard.

On July 19, 2001, and additional study was conducted to supplement the vibration levels previously measured in town. A loaded 18-wheeler belly dump truck (36,000 kilograms [80,000 pounds] in weight) was driven on Loop Road, and a pavement bump was used to increase vibration. The loaded truck traveled across the pavement bump at the three following speeds: 15 km/hr, 30 km/hr, and 50 km/hr (10 mph, 20 mph, and 30 mph). The peak particle velocities measured 1.5 meters and 5 meters from the lane are shown in Table III-27. Although the truck was heavier than those used to haul construction materials through Georgetown and traveled at a higher speed, maximum vibration falls well below the Swiss standard.

The results of these studies indicate that construction traffic did not produce damaging vibrations. All vibration events that occurred during all truck activities fell below the conservative Swiss standard threshold limits. More detailed information can be found in the report: *Nondestructive Testing Investigation Vibration/Noise Measurement Study Construction Traffic Through Historic District Georgetown Colorado* (Olson Engineering, October, 2001).

6g. Traffic Delays

Clear Creek County/Town of Georgetown

Some reconstruction activities may require part-day closures. For delays longer than 30 minutes, public notice will be given in advance through the local media and by informational signs. In coordination with businesses and landowners, a construction schedule will be created to minimize excessive delays and limit the times of day construction vehicles travel through the Town of Georgetown. The schedule would be made public to inform residents and other traffic of possible construction delay periods. If the 7th Street bridge is constructed and used as a haul

route, traffic disruptions through town will be less than if construction traffic were forced to wind through town to use the existing 11th and 6th Street bridges.

Park County/Grant

As with the Clear Creek County side, part-day road closures will take place only during rock blasting operations in reconstruction areas. Traffic delays of up to 30 minutes are typical through the construction zone. For delays longer than 30 minutes, public notice will be given in advance through the local media and by informational signs. Coordination will be made with businesses and landowners to accommodate special needs. A construction schedule will be made public to inform residents and the traveling public of possible construction delay periods.

Table III-25
Summary of Peak Particle Velocities

Address	Peak Particle Velocity (During Hauling Hours)	
	mm/s	in/s
505 2nd St	2.604	0.103
207 Rose St	1.905	0.075
200 Rose St	1.016	0.040
300 Rose St	2.413	0.095
Hamill House (front)	1.016	0.040
Hamill House (back)	3.810	0.150
6th and Rose St	1.524	0.060
Rooftop of 6th and Rose St	0.508	0.020
927 Rose St.	0.635	0.025

Table III-26
Swiss Standard for Vibrations in Buildings
Building Class IV (objects of historic interest)

Vibration Source	Frequency Range (Hz)	Peak Particle Velocity
Machines, Traffic	10-30	3.05 mm/s (0.12 in/s)
	30-60	3.05-5.08 mm/s (0.12-0.2 in/s)
	>60	5.08 mm/s (0.2 in/s)

Table III-27
Vibration Study Conducted Along Loop Drive on 7/19/01

Source	Approximate Speed km/h (mph)	0.15 m (0.5 ft) from Southbound Traffic mm/s (in/s)	4.5 m (15 ft) from Southbound Traffic mm/s (in/s)
Truck*, Uphill (South)	15 (10)	0.1905 (0.0075)	0.0686 (0.0027)
Truck*, Downhill (North)	15 (10)	0.0889 (0.0035)	0.0381 (0.0015)
Truck*, Uphill (South)	30 (20)	0.2489 (0.0098)	0.0762 (0.0030)
Truck*, Downhill (North)	30 (20)	0.1168 (0.0046)	0.0711 (0.0028)
Truck*, Uphill (South)	50 (30)	0.3480 (0.0137)	0.1372 (0.0054)
Truck*, Downhill (North)	50 (30)	0.2311 (0.0091)	0.0762 (0.0030)
*Truck = loaded 18-wheel belly dump (36 metric tons (40 tons))			

6h. Economic Impacts

In addition to the potential construction impacts described above, representatives of a local dude ranch have expressed concerns about construction impacts directly affecting their business. Some of these concerns include the noise, dust, and visual impacts produced by construction activities; safety hazards; fewer guests that would result from construction activity; the diminished experience for guests that would result from construction activities in the area; traffic delays along the entire route; and the construction schedule between Grant and Geneva Park. The dude ranch has indicated that any construction activity between Grant and Geneva Park from June through August would be unacceptable to them.

The Town of Georgetown has indicated that any construction on Guanella Pass Road will result in an economic impact that may be unacceptable to the business owners in the town. Businesses in Georgetown rely on the mountain town character and setting that drive the tourism industry in Georgetown.

Case Studies

To better assess the possible economic impacts to surrounding communities resulting from the proposed construction activities on Guanella Pass Road, three case studies are provided. These case studies come from three communities that have experienced roadway construction projects similar to the proposed improvements to Guanella Pass Road. These communities include Empire, Colorado; Cody, Wyoming; and Buena Vista, Colorado.

Empire, Colorado

US 40 runs south and east in northern Colorado, ending in Empire, Colorado. Recently, the road underwent construction improvements that began in April 2001 and ended in early September 2001. Information about economic impacts to the community was obtained from the mayor of Empire and the accountant for Clear Creek County.

Some similarities of the US 40 work to the Guanella Pass potential improvements includes the "recreation destination" nature of the road corridor and surrounding communities and the size of the community of Empire in comparison to Grant.

The mayor of Empire felt that it would be difficult to report the "before" economic situation in Empire because the town hall burned last November, which housed the Hard Rock Cafe (a large tourist attraction). Also, the economy statewide has seen a downturn in recent months, so it is difficult to measure local impacts. However, the mayor felt that the negative impacts that they thought would occur from construction were never realized. This is mostly because of the patience of the community throughout the construction. The community was open to the construction as they could see the need for improvements and knew that the end result would be worthwhile.

Businesses such as restaurants actually saw an improvement in many cases because of the patronage of construction workers. The Dairy King, a local restaurant, reported increased sales in July 2001 as compared to July 2000. Herb's Shop n' Go also had a good season financially. Some businesses were down, but not necessarily because of construction. A local antique store, for example, was down financially for the year. The business' economic losses were possibly due to a number of factors, such as a slow economy or construction impacts.

Other observations made by residents of Empire were that the construction companies were very considerate in how they conducted their work and were also very accommodating. There may be an economic improvement coming for the town because of the road project, as it has provided a "facelift" for the town.

The accountant for Clear Creek County provided gross and retail sales, by quarter, for Empire. These numbers were for the period before the construction. Gross and retail sales information for the quarter during the heaviest construction (July through September, 2001) was obtained from the Colorado Department of Revenue. Both gross and retail sales increased during construction as compared to the previous quarter and the same quarter in 2000.

Cody, Wyoming

US 14 runs east-west from the East Entrance of Yellowstone National Park and goes through Cody, Wyoming. Recently, the road underwent construction improvements that began in 1995 and ended in the fall of 2001. Information about economic impacts to the community was obtained from staff at the Cody Chamber of Commerce.

The US 14 project consisted of 27 miles of reconstruction from the East Entrance of Yellowstone towards Cody. The project consisted of four sections – three outside the park (Wyoming Department of Transportation jurisdiction) and one inside the park (park jurisdiction). Two portions outside of the park, about 18 miles, are completed thus far. Construction on the third portion, seven miles from the park, will begin in the spring of 2003.

A major difference between the US 14 project and the proposed improvements to Guanella Pass Road is that the Chief Joseph Scenic Byway serves as an alternative entrance to the park (Northeast entrance). This enabled visitors entering Yellowstone to pass through Cody using the alternative route during construction. Also, roads in Cody are much wider and can easily accommodate truck traffic. Some similarities include winter closures of the roadway, the functions of Cody and Georgetown serving as "gateways" to a feature attraction, and the presence of guest/dude ranches along the affected roadway.

The following information in Table III-28 was obtained from the Chamber of Commerce for the periods prior to and during construction.

Table III-28
Commerce Prior to and During Construction Activities - Cody, Wyoming

Economic measure	1992 (pre-construction)	1997 (during peak construction activities)	2000 (construction activities slowing down)
US 14, Yellowstone E. entrance yearly traffic volumes	541,847	277,761	333,739
Chief Joseph Scenic Byway, Yellowstone NE entrance yearly traffic volumes	143,237	204,876	158,901
Cody yearly sales tax collections	$4,845,407*	$8,252,881	$10,511,393
Cody Summer Rodeo total attendance	66,173	59,860	74,668
* The sales tax rate for Cody was raised in 1994 from three percent to four percent. To provide an accurate comparison of sales tax collections for the years shown, the 1992 sales tax collection would be $6,472,542 at a four percent rate.			

The numbers show that the Yellowstone East Entrance traffic volumes decreased substantially during construction activities, but have started to increase as the construction is nearing completion. However, the Chief Joseph Scenic Byway, which serves as an alternative entrance to the park, saw an increase in numbers during the construction. (Note: the NE Entrance adds approximately one hour to the trip for people going through the park – two and a half vs. three and a half hours.)

Actual impacts to the businesses of Cody during and after construction are difficult to quantify because of other impacts that might have an effect on the economy as well. Tax collections for the same periods show that the numbers increased throughout the entire period. These increases might also be attributed to the following factors: an increase in the sales tax rate for Cody in 1994 from three to four percent (this would translate into $6,472,542 for 1992 – still a substantial increase); the opening of a Wal-Mart (1994) and other retail stores in Cody; and overall growth in the town, including factors such as an increase in the amount of rooms at lodging facilities in town from 1,250 to 1,500 during this time period.

Attendance for the local rodeo that is held every night during the summer is shown here for comparison. The numbers show that business slowed during the main construction period, but have increased significantly as the construction activities are slowing down. However, it is not certain that road construction was a factor in reduced rodeo attendance.

The Chamber of Commerce reports that some local businesses complained of decreased sales during construction activities; but again, this could be due to both the increase in the number of retail businesses in Cody and construction activities.

Buena Vista, Colorado

County Road 306 (CR 306) runs primarily east-west, starting in Buena Vista, Colorado over Cottonwood Pass and ending in Almont as CR 742. Information concerning the construction activities on this road and impacts to Buena Vista was obtained from staff at the Buena Vista

Chamber of Commerce. The Public Works Director for the Town of Buena Vista also provided information about local businesses during and after construction activities.

The road, formerly a dirt road, was reconstructed and paved only on the Buena Vista side of Cottonwood Pass, as this section is under the jurisdiction of Chaffee County. Gunnison County opted not to pave the road that falls within their jurisdiction because of environmental and other concerns that would occur with reconstructing the roadway. Road improvements were made to address the increasing traffic volumes on the pass, causing safety concerns. Traffic volumes had reached 5,000 to 6,000 cars per day on peak weekends such as the 4th of July. Dust from traffic reached unacceptable levels as well.

The construction took place over a two-year period and ended in the early 1990s. The work was done in two stages during the off-season (spring and fall), which made it easier on local communities and travelers. Because of the off-season work, road closures were not necessary.

Some similarities of the CR 306 work to the Guanella Pass potential improvements include seasonal winter closures, recreation opportunities on and around the road corridor, and the sharing of the road by two counties.

The Buena Vista Chamber of Commerce feels that the construction did not have a significant economic impact on local businesses because the work was completed in the off-season. After construction, services such as scenic tours on the improved road have become more popular. Traffic through Buena Vista and on the roadway has also increased as a result.

The Chamber reported that economic impacts, shown by sales tax information from that time, might not be entirely due to the construction activities. The impacts of construction alone are difficult to measure because a major employer of the town shut down at the time. The town was going through a recession and was suffering economic hardship unrelated to the construction project.

The Town of Buena Vista also feels that businesses did not experience significant impacts from the construction because of the off-season work; in addition, there were no road closures during construction, which lessened impacts. Many businesses were in favor of the road paving, although traffic volumes were projected to increase by three times over existing volumes. Traffic volumes have increased over the roadway since the construction, and the economy has improved with the increase of visitors to the town.

Conclusions

The previous three examples indicate that revenue may decrease in nearby towns during periods of construction activity. However, this decrease is often not as dramatic as anticipated and economies can return to their original levels in a short period of time following construction. Careful planning of construction activities can minimize the economic impacts on a community.

6i. Reducing Construction Impacts

Several opportunities exist to reduce impacts to Clear Creek County, Park County, and the Town of Georgetown.

- Material sources and/or asphalt batch plants will be located along Guanella Pass Road in both Clear Creek County and Park County. Potential locations include Duck Lake and the Geneva Basin Ski Area in Park County. Use of these sites will reduce the amount of hauling on the lower portions of the road in Park County and through the Town of Georgetown.

- Using smaller hauling trucks (10 wheels versus 18 wheels) would likely reduce the overall amount of truck-related impacts through Georgetown (noise and vibration), but would increase the amount of truck trips by about 25 percent. Therefore, this is not considered desirable.

- Construction of the 7th Street bridge in Georgetown and the relocation of Brownell/Argentine Street will allow construction traffic to avoid narrow roads and sensitive areas of town while improving everyday traffic flow according to the Town's requests.

- Local residents and businesses will be coordinated with in developing the construction and traffic control schedule to minimize construction impacts. In addition, the construction schedule will be publicized in the media.

- A public information plan will be developed that involves notification of construction schedules and activities on a weekly basis. This information will be available through the media, a 1-800 hotline number, and the project website.

- All roads in Georgetown that are used as a haul route by construction vehicles or equipment will be repaired, restored, or resurfaced. In addition, a permanent new bridge will be built at 7th Street connecting Argentine/Brownell and Rose Streets to reduce haul route impacts. The section of Argentine/Brownell Street that will be used extensively as a haul route will be moved one road width to the west and reconstructed as requested by the Town of Georgetown. These actions are in compliance with *The Town of Georgetown Comprehensive Plan* (2000).

- The drainage of Guanella Pass Road near Georgetown will be improved if the Georgetown segments are included in the Preferred Alternative; specifically, the area between the third and fourth switchbacks above Georgetown and along Rose Street between 2nd Street and 5th Street. Drainage currently comes down the switchbacks into town and flooding sometimes occurs.

A more comprehensive discussion of mitigation measures for construction impacts are listed in **Chapter IV.I: Construction**.

C. OTHER RESOURCES

1. Air Quality

Affected Environment

Existing air quality conditions in the project area are within the limits set by the federal government. The project area is not located within an EPA-designated non-attainment area. The nearby Mt. Evans Wilderness is designated a Class II area by the Clean Air Act. Vehicle emissions from traffic on Guanella Pass Road are well below emission standards for this land classification and do not pose a threat to wildlife populations, vegetation, or human populations

along the road corridor. The proposed project is in the Colorado State Transportation Improvement Program. However, dust along the road corridor is a problem. The gravel road surface has been worn away, exposing the subgrade. Vehicle traffic on the worn roadbed produces dust in the air. This dust diminishes the scenic vistas in the area and is a hindrance to the enjoyment of those driving the road for recreation.

Environmental Consequences

With the exception of increases in dust, increases in traffic resulting from roadway improvements do not have a major impact on air quality along the road corridor. The expected vehicle emissions of hydrocarbons, nitrogen oxides, sulfur dioxide, carbon monoxide, and suspended particulate matter are within the National Ambient Air Quality Standards and do not create health hazards to the public, wildlife, or vegetation in the project corridor.

Alternative 1

Under Alternative 1, the dust problem will continue to worsen as the traffic volumes increase. The road will not see any improvements to the surface, therefore the dust problems will continue to impact the air quality.

Alternative 2

Alternative 2 reconstructs the roadway with a paved surface that eliminates the dust problem. All of the current gravel surfaces are eliminated and paved over with asphalt. There will be no dust generation, which should improve the air quality surrounding the Guanella Pass Road area. Visitors will be able to enjoy their activities without being affected by air quality issues.

Alternative 3

Alternative 3 reconstructs the roadway with a paved surface in those areas that are currently paved and a gravel surface in those areas that are currently gravel. Although the new road surface initially reduces the amount of dust in the air, it is likely that funding for maintenance activities (dust control measures, new gravel, etc.) will not keep pace with traffic increases. This results in the degradation of the gravel surface, leading to a dust problem similar to that which currently exists but magnified by the expected increase in traffic volume.

Alternatives 4 and 5

Alternative 4 and Alternative 5 result in a paved surface over 85 percent of the road. The remaining 15 percent of the road (5.7 kilometers [3.5 miles]) has a gravel surface with dust problems that increase as traffic volumes increase, but the overall net effect will be a decrease in dust due to the increase in paving areas.

Alternative 6

Alternative 6 consists of 56 percent paved/chip seal surface, 30 percent macadam surface, and the remaining 14 percent is a gravel surface. The additional hardened surface will help reduce dust. As noted before, the dust suppression of the alternative surface types is a beneficial impact to the air quality in the corridor. If the gravel with no stabilization option is chosen, dust would be reduced but over time would again become a problem.

2. Noise

Affected Environment

A traffic noise analysis was conducted for the Guanella Pass Road improvement project in accordance with 23 CFR 772. The existing condition, Alternative 1 (No Action), and all build alternatives (Alternatives 2-6) were analyzed in the *Construction Noise Report for the Guanella Pass Road Improvement Project* (Hankard Environmental, November, 2001).

Noise abatement criteria have been established by the FHWA to define noise limits at which abatement measures must be considered. These limits vary by land-use type (Table III-29). The limit for recreational and residential land uses (Activity Category B) is 67 dBA. The limit for lands for which serenity and quiet are of extraordinary importance (wilderness area, outdoor theater, etc.) is 57 dBA (Activity Category A). The activity categories along Guanella Pass Road are primarily residential and recreational facilities.

Noise analyses were conducted along eight separate sections of Guanella Pass Road because traffic volumes vary along the length of the road. The sections are shown in Table III-30. Each noise analysis evaluates the noise energy produced by traffic based on traffic volume, type of vehicle, speed of vehicles using the roadway, gradient, etc. The existing and future noise levels were determined using the FHWA noise model FHWA-RD-77-108. Noise levels were calculated at 3-meter (10-foot) increments between 12 meters (40 feet) and 60 meters (200 feet) from the centerline of the roadway. The traffic noise was modeled without accounting for the effects of barriers, foliage, or elevation (worst case scenario). Existing noise levels for each of these locations are summarized in Table III-30, and the data is represented graphically in Figures III-24 and III-25.

The current noise levels on Guanella Pass Road are between 53 dBA and 58 dBA at 12 meters (40 feet) from the centerline of the road. The current noise levels at 60 meters (200 feet) are between 43 dBA and 47 dBA. The Mount Evans Wilderness Area boundary is approximately 90 meters (300 feet) from the road at the summit. The existing noise level at the wilderness boundary is less than 43 dBA.

Table III-29
FHWA Noise Abatement Criteria

Activity Category	Acceptable Levels (dB(A))	Description of Activity Category
A	57 (exterior)	Lands on which serenity and quiet are of extraordinary importance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose
B	67 (exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals
C	72 (exterior)	Developed lands, properties, or activities not included in Categories A or B above
D	Not Applicable	Undeveloped lands
E	52 (interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums
Source: Federal Register, Volume 47, No. 131, July 8, 1992, Rules and Regulations		

Environmental Consequences

This noise analysis addressed Alternative 1 (No Action) and each of the build alternatives. For each of the road sections analyzed, the predicted 2025 noise levels for Alternative 6 most closely match the Alternative 1 noise simulations. Indeed, for several sections of Guanella Pass the Alternative 6 predicted noise values are nearly identical to the Alternative 1 values.

Along Loop Drive and Spring Street in Georgetown, noise levels are controlled by traffic on Interstate 70 and not Guanella Pass Road. No substantial benefit is derived from mitigation of local traffic noise.

Predicted future noise levels are shown in Table III-30 and in Figure III-24 and Figure III-25. The noise abatement criteria in Table III-29 contain levels at which noise reduction measures must be considered. In addition, state transportation agencies typically consider a 10 or 15 dBA increase in noise level to be substantial, and therefore would also warrant consideration of mitigation measures.

The noise analysis conducted for each of the eight sections of Guanella Pass Road concludes that predicted noise levels do not approach or exceed 67 dBA in any section under any alternative. No alternative, including Alternative 1, is predicted to exceed 57 dBA at a distance of 20 meters (65 feet) from the centerline of the road in the year 2025. None of the predicted 2025 noise levels increase by 10 dBA or more for any alternative anywhere in the study area. This analysis finds that none of the alternatives produce substantial noise impacts.

3. Hazardous Materials

Affected Environment

An initial site assessment (ISA) was conducted along the Guanella Pass Road corridor in accordance with the American Society for Testing and Materials (ASTM) Standard E1527-94. The assessment included an area approximately 60 meters (200 feet) on either side of the road. The purpose of this ISA was to evaluate the potential for contamination of on-site soils and groundwater that may have resulted from the release of hazardous substances or petroleum products during previous or current activities within the area. The evaluation was based on data review, field observations, and personal interviews. Records and reports that were reviewed included historical maps and aerial photographs, professional papers, and other related studies. In addition, government agencies were contacted concerning possible generation, storage, treatment, and disposal of hazardous waste or releases of hazardous substances or petroleum products on or adjacent to the study area. Site visits were conducted to evaluate present site conditions and adjacent site usage. Interviews of persons with knowledge of historical activity on or near the road were conducted.

Agencies contacted during the preparation of the ISA included county environmental health departments, CDPHE, FS, EPA, and other entities with knowledge of the project area. Results of the contacts with these agencies are incorporated into the Environmental Consequences discussion below.

Table III-30
Existing and Projected Future Noise Levels Along Guanella Pass Road

Section	Approx. Station No.	Existing 12 m (40 ft)	Existing 60m (200 ft)	2025 Alt 1 12 m (40 ft)	2025 Alt 1 60 m (200 ft)	2025 Alts 2,4,5* 12 m (40 ft)	2025 Alts 2,4,5* 60 m (200 ft)	2025 Alt 3 12 m (40 ft)	2025 Alt 3 60 m (200 ft)	2025 Alt 6 12 m (40 ft)	2025 Alt 6 60 m (200 ft)
1	1+000	55	45	58	47	59	49	58	48	58	48
2	9+000	55	45	58	47	58	48	58	48	58	48
3	19+000	55	45	56	45	59	48	56	46	56	46
4	24+000	54	43	56	46	58	48	56	46	56	46
5	25+000	54	44	57	47	59	49	57	47	57	47
6	28+000	53	43	56	45	58	47	56	46	56	46
7	32+000	54	44	55	45	58	47	56	46	56	46
8	36+000	58	47	60	49	61	51	61	50	60	49

**Worst case (80 percent traffic increase)*
Source: Guanella Pass Road Construction Noise Report, November, 2001

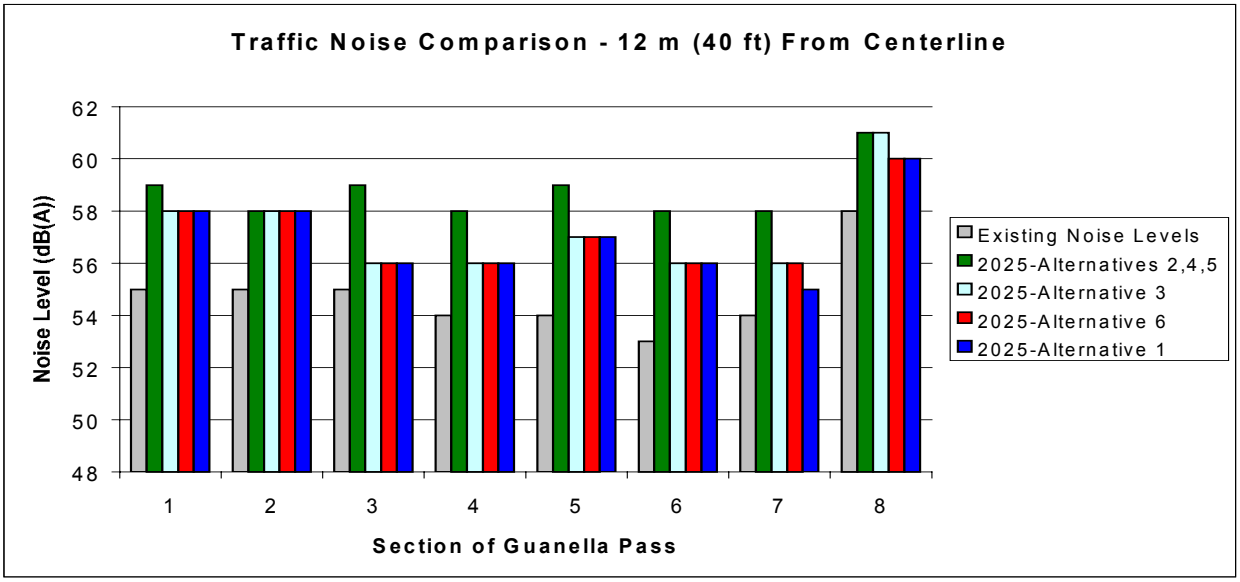


Figure III-24
Comparison of Traffic Noise at 12 meters (40 feet) from Centerline

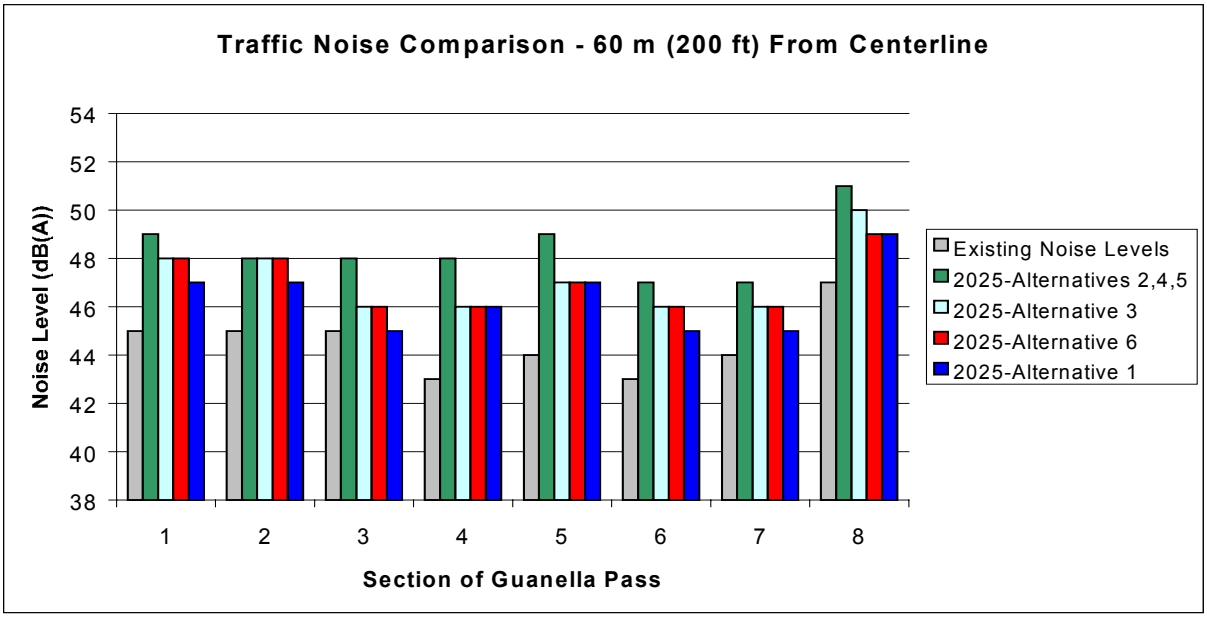


Figure III-25
Comparison of Traffic Noise at 60 meters (200 feet) from Centerline

In September 2001, an additional field survey was conducted as part of a Phase II investigation to map the geology and surface materials along the existing road and delineate mine dumps and potentially mineralized bedrock (*Colorado Forest Highway 80, Guanella Pass Road Phase II Investigation*). This study reconfirmed the locations of the mine dumps identified in the ISA and also identified other features in the vicinity of the road. Any additional studies or sampling that may be required will be determined during final design in coordination with the appropriate agencies (CDPHE, EPA).

During the ISA research and site visits, thirteen areas with evidence of potential spills, use of hazardous materials or petroleum products, or evidence of mining, were identified within or near the Guanella Pass Road corridor. During the Phase II investigation two other features were identified and a search was performed to identify water seeps at mine dumps and fault/fracture zones. The areas of potential hazardous materials concern within the study area are listed in Table III-31. Of these areas, four were determined to have no potential impact on the road because of their locations. All 13 site locations, identified in the ISA, and other features identified during the Phase II investigation are discussed in the following sections.

Site Location 1 – Grant Country Store (Station 1+000)

Former leaking underground storage tanks (LUSTs) were located near the Grant Country Store. The store is approximately 100 meters (325 feet) southeast of Guanella Pass Road on U.S. Highway 285. The tanks were removed, and the site is designated as closed. The tanks appeared to have been located east and downgradient from Geneva Creek and Guanella Pass Road, and north and upgradient from the North Fork of the South Platte River. The facility no longer sells or dispenses gasoline. No fuel islands were observed. Road improvements are not expected to impact this site.

Site Location 2 – Platte River Inn (Station 1+000)

Motor oil-stained soil was observed outside a garage on the east side of the Platte River Inn. The stained soil is approximately 80 meters (260 feet) east of Guanella Pass Road on U.S. Highway 285 and appears to be downgradient from Geneva Creek and Guanella Pass Road. Road improvements will not impact this area.

Site Location 3 – Storage Yard (Station 1+000)

A storage yard is located west of the road and adjacent to Geneva Creek at Grant. Motor oil-stained soils were observed at this location. Access to the property for closer inspection was not permitted.

The petroleum-stained soils are not expected to be encountered by road improvements made to the existing roadway. However, because of its proximity to the road, a spill or release at the storage yard has the potential to impact the subsurface in the road corridor.

Table III-31
Potential Hazardous Material Sites within the Guanella Pass Road Study Area

Site	Name/Description	Location (station)	Potential Impacts
1	Grant Country Store	1+000	No potential impacts expected for Alternatives 1-6.
2	Platte River Inn	1+000	No potential impacts expected for Alternatives 1-6.
3	Storage Yard	1+000	No potential impacts expected for Alternatives 1, 4, 5, and 6. Possible involvement due to excavation in possible spill area for Alternatives 2 and 3.
4	Geneva Park Pasture	10+800	No potential impacts expected for Alternatives 1-6.
5	Abandoned Geneva Basin Ski Area	18+500	No potential impacts expected for Alternatives 1-6. No potential impacts expected if area is used for wetland mitigation.
6	Cabin Creek Hydroelectric Plant	30+600	In compliance with the Resource Conservation and Recovery Act. No potential impacts expected for the Plant itself for Alternatives 1-6.
7	Kirtley Mine	35+200 – 35+400	Disturbance to mine tailings and mine dump waste adjacent to the roadway is expected for Alternatives 2 and 3 due to full reconstruction. No potential impacts expected for Alternatives 1 and 4 due to no action. Minor direct impacts expected for Alternatives 5 and 6 due to rehabilitation.
8	Mine Dump	36+100	Disturbance to mine tailings and mine dump waste adjacent to the roadway is expected for Alternatives 2 and 3 due to full reconstruction. No potential impacts expected for Alternatives 1 and 4 due to no action. Minor direct impacts expected for Alternatives 5 and 6 due to rehabilitation.
9	Mine Dump	36+300	Disturbance to mine tailings and mine dump waste adjacent to the roadway is expected for Alternatives 2 and 3 due to full reconstruction. No potential impacts expected for Alternatives 1 and 4 due to no action. Minor direct impacts expected for Alternatives 5 and 6 due to rehabilitation.
10	Mine Dump with Buildings	38+700	No potential impacts expected for Alternatives 1-6.
11	Mine Dump	38+800	No potential impacts expected for Alternatives 1-6.
12	Mine Dump	39+500	Disturbance to mine tailings and mine dump waste adjacent to the roadway is expected for Alternatives 2-6. No potential impacts expected for Alternative 1.
13	Former Railroad Grade and Smelter	39+800	Disturbance to mine tailings and mine dump waste adjacent to the roadway is expected for Alternatives 2-6 if the temporary construction bypass bridge is constructed. No potential impacts expected for Alternative 1.
Other (from Phase II)	Equator Tunnel	35+510	Disturbance to tunnel may occur for Alternatives 2 and 3. No potential impacts expected for Alternatives 1, 4, 5, and 6.
Other (from Phase II)	Silverdale/Ocean Wave Tunnel	35+830	Disturbance to tunnel may occur for Alternatives 2 and 3. No potential impacts expected for Alternatives 1, 4, 5, and 6.

Source: Initial Site Assessment Guanella Pass Road Clear Creek and Park Counties, Colorado, February 18, 1997.

The work in this area, under Alternatives 4, 5, or 6, will be either rehabilitation or no action and is not expected to require excavation of material. If road excavation is required in this area, as it may be under Alternatives 2 and 3, then samples of the stained soils at the storage yard should be obtained and analyzed. If the surface stains extend deeper than several inches into the soil, a subsurface study should be conducted to evaluate the extent of the impact.

Site Location 4 – Geneva Park Pasture (Station 10+800)

Two small areas of disturbed soil were observed in the field 100 meters (325 feet) west of the road and beyond the designated study area. The field appears to be used as pasture. No evidence of hazardous materials or petroleum products was observed in the visible portions of the disturbed areas; however, access to the property was not permitted. The disturbance may be related to historic peat mining. Because it is downslope and far from Guanella Pass Road, this area is not expected to impact the road corridor.

Site Location 5 – Abandoned Geneva Basin Ski Area (Station 18+500)

This is the site of the former Geneva Basin Ski Area (see Figure III-26). The main ski lodge was destroyed in a controlled fire initiated by the FS in 1994. Debris from the fire was observed within the foundation of the former lodge. An above-ground storage tank (AST) was observed approximately 200 meters (650 feet) northwest of the demolished lodge. It is unknown if the AST contained fuel. The AST was located close to the Duck Creek Realignment which was dropped from further consideration. A location near the ski area is, however, being evaluated as a potential materials source location and wetland mitigation site. All of the above-ground remnants of the ski area have been removed except for some of the building foundations.

Contacts with an FS enforcement officer revealed that, in 1980, a LUST was removed from the Geneva Basin Ski Area following the observation of petroleum products in nearby Duck Creek. The impacted soil was removed and backfilled with clean fill material "to the extent that the ski area's damage deposit would allow." The FS could not locate a closure report for this site.

Possible spills of fuel from the AST may have impacted the subsurface and groundwater of the study area. However, current information on the location of the AST (200 meters (650 feet) northwest of the demolished lodge) places the former AST west of Duck Creek in an area that will not be disturbed by the potential materials source location and wetland mitigation site.

Although the extent of the cleanup activities of the LUST could not be determined, the former location has been identified at approximately 75 meters (246 feet) northwest of the demolished lodge. The former LUST is down gradient of the area proposed for the potential materials source location and wetland mitigation site and will not be disturbed during construction of the wetland.

It is not known if the FS took samples for asbestos and lead-based paint before burning the lodge. However, the former lodge is down gradient of the area proposed for the potential materials source location and wetland mitigation site and will not be disturbed during use as a materials source or by construction of the wetland.

Site Location 6 – Cabin Creek Hydroelectric Plant (Station 30+600)

The Cabin Creek Hydroelectric Plant, owned and operated by Xcel Energy (formerly Public Service Company of Colorado), is east of and immediately adjacent to Guanella Pass Road.

Access to the property is limited to the gravel road around the reservoir. The interior of the buildings were not observed during the on-site evaluation. Orange-stained sediments were observed in a stream north of the dam. Xcel Energy confirmed that, as of June 5, 2002, there have not been any transformer fires or leaks along the alignment. If any contaminated soil is found during utility relocation or construction, then the FHWA will coordinate with Xcel Energy for them to conduct any necessary clean-up as part of their utility relocations.

Site Location 7 – Kirtley Mine (Station 35+200 to 35+400)

This is the site of the Kirtley Mine and Marshall Tunnel. The tunnel diverts Leavenworth Creek away from the mine dump area. Abandoned machinery processed ore (tailings) were observed west of the road. Leavenworth Creek is currently experiencing water-quality problems associated with mine wastes. The road crosses the mine waste dump (material excavated from the mine). A mine waste dump, apparently from the Kirtley Mine, was also observed in the South Clear Creek valley east of the road at this location. Proposed roadway improvements through this area under Alternatives 2, 3, 5, and 6 are expected to disturb the mine waste adjacent to the existing road. These areas may contain elevated metal concentrations in the subsurface of the study area. It may be necessary to sample the mine tailings to determine what special precautions, if any, may need to be implemented during any mine waste disturbance. See further discussion below.

Site Locations 8 through 12 – Mine Dumps Between Station 36+100 and Station 39+500

Mine waste was observed adjacent to one or both sides of the road at five locations between station 36+100 and station 39+500. An abandoned wood building was also observed south of the road at Site Location 12. No evidence of hazardous wastes or petroleum products was observed at these locations. Proposed roadway improvements through these areas may disturb the mine waste adjacent to the existing road. These areas may contain elevated metal concentrations and exhibit corrosive characteristics that may have impacted the subsurface of the study area. Mine dump materials excavated under any of the build alternatives would be reused as fill, and slopes exposed by the work would be covered with soil and revegetated, if practicable (i.e., slopes less than 2:1 grade). This onsite management approach is consistent with other projects performed by CDOT in mineralized areas in Colorado, including the North Fork of Clear Creek and locations where CDOT has used soils with elevated metals concentrations in highway construction. It may be necessary to sample the mine tailings to determine what special precautions, if any, need to be implemented during disturbance of any mine tailings. See further discussion below, under **Environmental Consequences**.

Site Location 13 – Former Railroad Grade and Farwell Smelter (Station 39+800)

A former railroad grade intersects the road at approximately station 39+800. Processed ore tailings and partial foundations from the historic Farwell Reductions Works, a smelter, are approximately 100 meters (325 feet) northwest of this point and directly north of the railroad grade. The smelter is on the south bank of Clear Creek. The Georgetown Bypass Realignment, which was dropped from further consideration, passes through this area. Also, the proposed temporary construction bypass and bridge passes through this area. It may be necessary to sample the mine tailings and railroad grade to determine what special precautions, if any, may need to be implemented during disturbance of these areas.

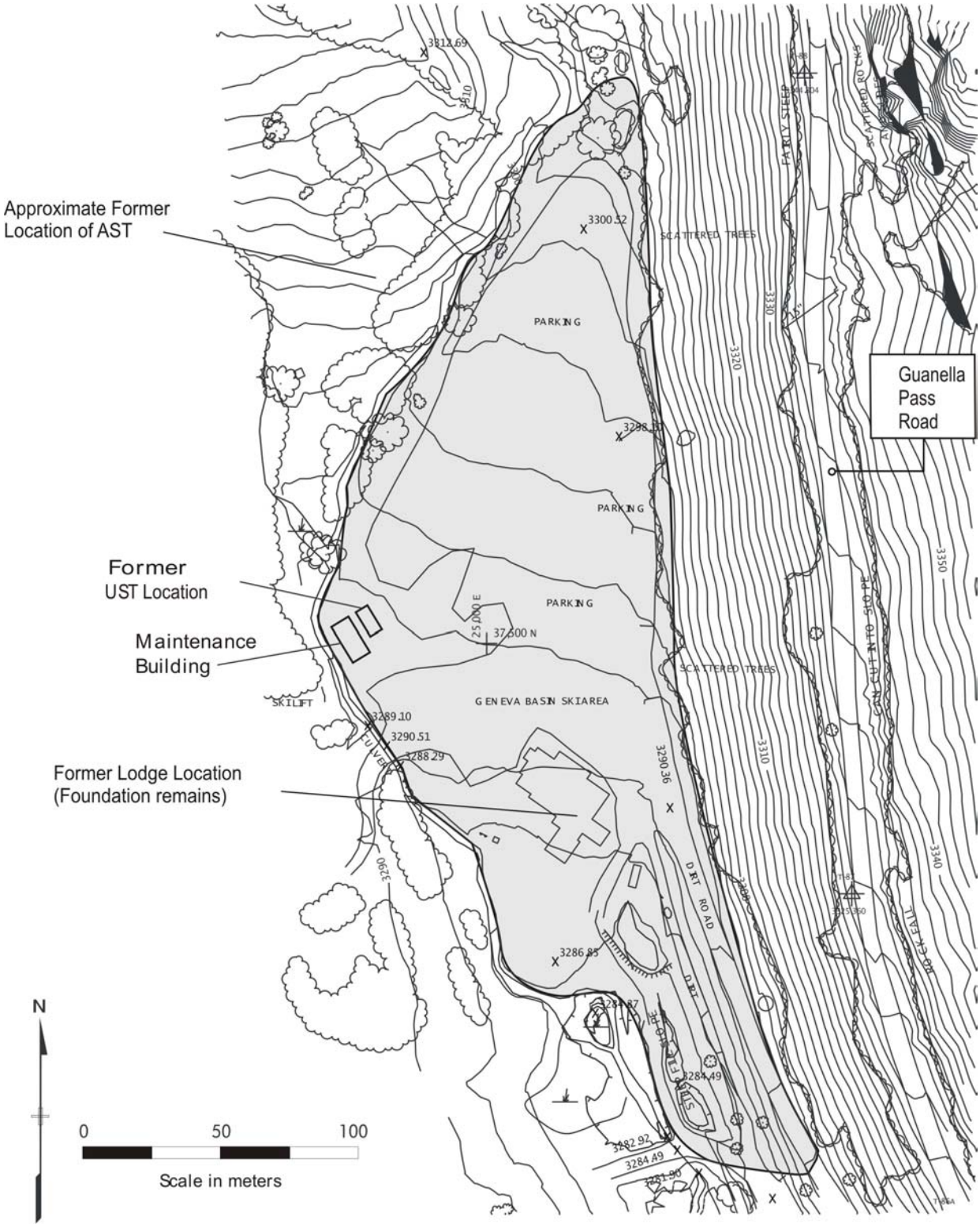


Figure III-26
Site Location 5: Abandoned Geneva Basin Ski Area

The subsurface in this area has the potential to have been affected by spills of diesel, motor oil and greases, wood-preserving products, and various unreported hazardous materials spilled from railcars. It also has the potential to contain elevated metal concentrations and may exhibit corrosive characteristics caused by the former smelter operations.

Other Sites – Seeps, Fault Structures or Fracture Zones

During the Phase II Investigation, conducted in September 2001, the following was performed: geology and surface materials along the existing road were mapped, mine dumps and potentially mineralized bedrock were delineated, locations of mine dumps previously identified from the ISA were reconfirmed, and fault or fracture zones in rock outcrops were surveyed for seeps. Research was also conducted on regulatory requirements for proper handling and disposal practices for mine dump materials. The report on these activities (*Colorado Forest Highway 80, Guanella Pass Road Phase II Investigation*) contains more detailed information on the field surveys conducted and management analysis for dealing with the mine dump materials. Following are other features identified from this effort:

- Equator Tunnel, located east of station 35+510 at the toe of the existing fill slope. A water seep emanates from the tunnel and migrates toward Clear Creek.

- Silverdale/Ocean Wave Tunnel, located on the east side of the road between stations 35+720 and 35+830. The actual portal of the tunnel could not be located and no water seeps were observed at the time of the fieldwork.

- Water seeps from mine dumps, fault or fracture zones in the vicinity of the project have a potential to contain elevated metals concentrations, which is a concern of the EPA and the CDPHE Water Quality Control Division (WQCD). No water seeps were observed at the time of the fieldwork at any of the mine dumps discussed above (Site Locations 7 through 12). No water seeps were observed at the time of the fieldwork at any of the fault or fracture zones in rock outcrops, located during the field review. It is possible that other seeps may be encountered during months that characteristically have higher runoff. Based on regulatory review and discussions with the WQCD and the Colorado Watershed Coordinator, any environmental concerns associated with seeps encountered because of construction will be addressed in the NPDES permit. This is discussed further below.

Environmental Consequences

No areas of potentially mineralized bedrock were identified that any of the build alternatives would affect. No mine drainage or seeps were identified that any of the build alternatives would affect. However, since seeps may be encountered or exposed during construction, any potential concerns from seeps will be addressed in the NPDES permit. Under a storm water discharge permit that would be obtained for the work, there will be requirements for reducing pollutants in storm water discharges from the construction site. The permit would include a Storm Water Management Plan (SWMP) that identifies BMPs, which, when implemented during construction, will meet the terms and conditions of the permit. The general construction permit includes basic (narrative) standards applicable to surface waters of the state, in accordance with *The Basic Standards of Methodologies for Surface Water* (5 CCR 1002-31). BMPs will be site management practices that minimize erosion and sediment transport (e.g., use of straw bales, silt fences, earth dikes, temporary or permanent sediment basins, flow diversion, etc.). The SWMP will also include a description of the measures used to achieve final stabilization and measures to

control pollutants in storm water discharges that might occur after construction operations have been completed.

Options for management of mine dump materials were reviewed during the Phase II investigation. Three management options were identified and evaluated as follows: 1) disposal of excavated mine dump waste in a commercial solid waste landfill; 2) management of excavated mine dump waste under the state's Voluntary Cleanup Program; and 3) disposal of excavated mine dump material in fill areas along the road or in a designated fill area near the road (onsite management).

Based on that review, an onsite management model developed between CDOT and CDPHE will be used for managing any mine dump materials disturbed by any of the build alternatives. The main onsite management goal will be to prevent the mine dump material from entering surface water. Based on the CDOT/CDPHE model any mine dump materials excavated under any of the build alternatives will be reused as fill, and slopes exposed by the work will be covered with soil and revegetated, if practicable (i.e., slopes less than 2:1). The mine dump materials will not be used near seeps or culverts that could transport sediment or metals into local surface water or groundwater. A solid waste management plan, if needed, will be prepared in coordination with the CDPHE and the plan will describe the approach in more detail. This onsite management approach is consistent with other projects performed by CDOT in mineralized areas of Colorado, including the North Fork of Clear Creek and locations where CDOT has used soils with elevated metals concentrations in highway construction.

In the area along the former railroad grade and near the Farwell Smelter, additional study (possibly subsurface sampling) may be required if the temporary construction bypass bridge is implemented. More detailed design of the temporary construction bypass bridge and detour would be required to determine the ground disturbance caused by this temporary bypass route and whether additional study is required.

No buildings are anticipated to be demolished by any of the build alternatives, therefore none of the alternatives will have any involvement with asbestos or lead-based paint. Xcel Energy and Intermountain Rural Electric Association will be contacted to determine the polychlorinated byphenyls (PCB) content of any transformers that may be affected by construction activities.

Further evaluation of potential hazardous material sites will continue up to the time of property acquisition. The selected alternative will avoid potentially contaminated sites whenever practical. Where avoidance is not practical, additional site investigation will be conducted. Any necessary cleanup plans will be coordinated with the appropriate agencies and landowners.

Alternative 1 – No Action

Since there are no construction activities under Alternative 1, there will be no impact to any hazardous material sites.

Alternative 2

The full reconstruction proposed under this alternative may disturb potentially hazardous materials at locations 3, 7-9, 12, 13, the Equator Tunnel, and the Silverdale/Ocean Wave Tunnel. Additional studies may be required at these locations for this alternative. No impacts are expected at sites 1, 2, 4-6, 10 and 11.

Alternative 3

The full reconstruction proposed under this alternative may disturb potentially hazardous materials at locations 3, 7-9, 12, 13, the Equator Tunnel, and the Silverdale/Ocean Wave Tunnel. Additional studies may be required at these locations for this alternative. No impacts are expected at sites 1, 2, 4-6, 10, and 11.

Alternative 4

This alternative may disturb potentially hazardous materials at locations 12 and 13 because of full reconstruction in those areas. Additional studies may be required at these locations for this alternative. No impacts are expected at sites 1-11, the Equator Tunnel, and the Silverdale/Ocean Wave Tunnel.

Alternative 5

This alternative may disturb potentially hazardous materials at location 7-9, 12, and 13 because of full reconstruction in those areas. No impacts are expected at site 1-6, the Equator Tunnel, and the Silverdale/Ocean Wave Tunnel.

Alternative 6

This alternative may disturb potentially hazardous materials at location 7-9, 12, and 13 because of light reconstruction in those areas. No impacts are expected at site 1-6, 10, 11, the Equator Tunnel, and the Silverdale/Ocean Wave Tunnel.

More detailed analyses of this topic are provided in the *Initial Site Assessment Guanella Pass Road Clear Creek and Park Counties* (Kumar & Associates, Inc., February 18, 1997); and *Colorado Forest Highway 80, Guanella Pass Road Phase II Investigation* (Foster Wheeler Environmental Corporation, December, 2001).

4. Section 4(f) Resources

The intent of the Section 4(f) Statute, 49 U.S.C., Section 303, and the policy of the FHWA, are to avoid historic sites and publicly owned recreational areas, public parks, and wildlife and waterfowl refuges. If avoidance is not possible, then a Section 4(f) evaluation must demonstrate that: (1) there is no feasible and prudent alternative to the use of Section 4(f) resources, and (2) the project includes all possible planning to minimize harm to any Section 4(f) resource.

HISTORIC SITES

There are several historic sites in the project area, which are discussed in **Chapter III.B.lg: Cultural Resources**. Of these sites, some of the build alternatives would have the potential to affect the GSPNHLD, Colorado Central Railroad Grade, and Mining Tailing Dumps. Below is a general description of these sites.

According to the FHWA's Section 4(f) Policy Paper, ROW takes within a historic district that do not affect any elements that contribute to the historic designation do not constitute a use of the district. A constructive use of land can occur when a transportation project does not incorporate

land from a Section 4(f) resource, but the project's proximity impacts are so severe that the protected activities, features, or attributes that qualify a resource for protection under Section 4(f) are substantially impaired.

Georgetown-Silver Plume National Historic Landmark District (Site # 5CC3)

Affected Environment

This 1,331 hectare (3,288 acre) historic district includes the towns of Georgetown and Silver Plume, as well as the valley between the two communities (Figure I-2). The communities in the district grew and flourished first as a mining region and later as a recreational center for the people of Denver. Guanella Pass Road begins in the historic district at Rose Street in Georgetown, extends southward along Leavenworth Mountain through a series of four switchbacks, and exits the district at the Georgetown Reservoir. The length of the road within the district is 3.0 kilometers (1.9 miles). Existing cuts associated with the road are visible from many vantage points throughout the district.

Environmental Consequences

Alternatives 2, 3, 5, and 6 use portions of three contributing elements, all mine tailing sites. Alternative 4 would use a portion of one of these sites. The impacts to these sites are addressed below under **Mine Tailing Dumps**.

New rock cuts and retaining walls along the switchback portion of the road, especially the 4th switchback above Georgetown, are visible from many vantage points in the historic district. Because Leavenworth Mountain is the backdrop to the historic setting of the GSPNHLD, the Town of Georgetown believes that any improvement of the switchbacks on the existing roadway may adversely affect the visual quality of the cultural landscape within the District. Proposed improvements included in all build alternatives would entail tree removal, cuts and fills, and retaining walls within the existing roadway construction limits. The FHWA has determined that the proposed project will be an adverse effect to the GSPNHLD under all build alternatives. Alternative 6 would have the least amount of impact to Leavenworth Mountain due to reduced roadway width, curve radii, and retaining wall height. This would also create the least amount of visual impact, and therefore the least amount of adverse impact to the GSPNHLD.

Construction traffic may be routed through Georgetown. This traffic would not produce vibrations sufficient to damage historical structures along the haul route, and consequently would not create a constructive use of the GSPNHLD.

The impacts listed above are discussed in more detail in **Chapter III.B.lg: Cultural Resources; Chapter III.B.3: Visual Quality;** and **Chapter III.B.6f: Vibration**.

Avoidance Alternatives

Guanella Pass Road begins in the GSPNHLD, and passes through it for 3.0 kilometers (1.9 miles). Because of its size, avoiding the district entirely requires major reconstruction creating new connections to existing roads and an extremely long detour through environmentally sensitive areas. The road would no longer serve its intended purpose as a rural local road for forest visitors and would no longer meet the purpose and need for the project. This alternative is not prudent or feasible.

Measures to Minimize Harm

The typical section for Alternative 6 is narrower than for the other build alternatives. This minimizes the impacts to Section 4(f) resources adjacent to the roadway. Retaining walls will be used to reduce the size of the rock cuts through the switchbacks above Georgetown. The use of rock stains to darken the light color of newly cut rock and the use of dark material for the retaining walls reduces visual impacts. Rock faces will be blasted in such a way that the resulting exposed rock will have an irregular, natural looking appearance. During the pre-construction inspection, special care will be used to delineate clearing limits so that small construction adjustments can allow additional trees to be saved.

Colorado Central Railroad Grade (Site # 5CC3.1/SCC9)

Affected Environment

The portion of this linear feature which falls within the Guanella Pass Road study corridor was originally part of the narrow-gauge rail-bed linking Georgetown to Silver Plume. The railroad grade intersects Guanella Pass Road at the second switchback just above and to the south of Georgetown.

Environmental Consequences

Consideration was given to constructing a temporary construction bypass bridge, which would use approximately 160 meters (525 feet) of the railroad grade, adjacent to the second switchback of the roadway. However, there is a feasible and prudent alternative to this use by constructing a permanent 7th Street bridge in Georgetown and route traffic on the bridge and existing streets. (See **Chapter III.B.6c: Hauling** for more information on this option.) Therefore, the temporary construction bypass bridge cannot be implemented as part of this project.

Mine Tailing Dumps (Site # 5CC988-993)

Affected Environment

These six sites consist of tailing piles and associated features, and are contributing elements to the historic landscape of the GSPNHLP.

Environmental Consequences

Three of the subject mine tailing dumps (#SCC988-990) would be directly impacted by Alternatives 2, 3, 5, and 6. The remaining three sites (#SCC991-993), located between the third and fourth switchbacks on Leavenworth Mountain, are not affected by the proposed project. Alternatives 5 and 6 would have less impact on sites #SCC988-990 because the proposed

rehabilitation would produce less ground disturbance than the reconstruction proposed under Alternatives 2 and 3.

A switchback of Guanella Pass Road passes through site #SCC988. Alternatives 2 and 3 would adjust the alignment and widen the road through this area, impacting a strip of the site approximately 6 meters (20 feet) wide on one side of the roadway. Alternatives 5 and 6 would rehabilitate the road in this area, impacting a strip approximately 1.5 meters (5 feet) wide.

Guanella Pass Road is adjacent to and partially on top of sites #5CC989-990. Alternatives 2 and 3 would impact a strip approximately 3 meters (10 feet) of site #5CC989 and 6 meters (20 feet) of site #5CC990 on one side of the roadway. Alternatives 5 and 6 would impact a strip approximately 1.2 meters (4 feet) of both these sites.

See Table III-32 for the amount of use of these sites under each alternative.

Table III-32
Section 4(f) Impacts
hectares (acres)

Location	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Mine Tailing Site #5CC988	0 (0)	0.09 (0.22)	0.09 (0.22)	0 (0)	0.02 (0.06)	0.02 (0.06)
Mine Tailing Site #5CC989	0 (0)	0.01 (0.02)	0.01 (0.02)	0 (0)	0.00 (0.00)*	0.00 (0.00)*
Mine Tailing Site #5CC990	0 (0)	0.01 (0.02)	0.01 (0.02)	0 (0)	0.00 (0.00)*	0.00 (0.00)*
Guanella Pass Campground	0 (0)	0.01 (0.02)	0.01 (0.02)	0.01 (0.02)	0.01 (0.02)	0.01 (0.02)
Whiteside Campground	0 (0)	0.01 (0.02)	0.01 (0.02)	0 (0)	0 (0)	0 (0)
Total	**0 (0)**	**0.13 (0.33)**	**0.13 (0.33)**	**0.01 (0.03)**	**0.03 (0.07)**	**0.03 (0.07)**

* Impacts in these areas are less than 0.01 hectares

Avoidance Alternatives

A switchback of Guanella Pass Road passes through site #SCC988 and near site #SCC178 (the Marshall Tunnel). Moving the roadway to avoid impacts to this site would require at least 0.7 kilometer (0.4 mile) of new roadway. This new alignment would create new environmental impacts, including impacts to plants and animals, visual resources, and water resources, in a previously undisturbed area. This alternative is not prudent.

Guanella Pass Road passes between the Georgetown Forebay Dam and Reservoir (itself a historic site) and sites #SCC989 and #SCC990. To avoid all of these sites, the road would need

to be moved to the east side of the reservoir. This would require at least 0.5 kilometer (0.3 mile) of new roadway. This new alignment would create new environmental impacts, including impacts to plants and animals, visual resources, and water resources, in a previously undisturbed area. This alternative is not prudent.

Measures to Minimize Harm

The typical section for Alternative 6 is narrower than for the other build alternatives. This minimizes the impacts to Section 4(f) resources adjacent to the roadway.

RECREATION AREAS

There are five FS campgrounds, two FS picnic areas, and one cooperatively developed (public and private) picnic area along or near Guanella Pass Road (Figure I-2), as well as numerous trailheads and associated parking areas. Of these sites, the build alternatives potentially affect the following three: Geneva Creek Picnic Area, Whiteside Campground, and Guanella Pass Campground.

Geneva Creek Picnic Area

The FS has existing plans to close this site by removing the vault toilet and picnic sites in order to rehabilitate the riparian area. Restroom and picnic tables will be provided at Whiteside Campground. Because the FS does not consider this picnic area to be a significant recreation resource and plans to close this picnic area, it is not considered to be a Section 4(f) resource.

Whiteside Campground

Affected Environment

Guanella Pass Road currently runs adjacent to and partially within the boundaries of this 1.5 hectare (3.6 acre) campground. There are five campsites within Whiteside Campground. The campground area includes picnic tables, toilet facilities, and a parking area. A footbridge that runs across Geneva Creek connects the camping area to the parking area.

Environmental Consequences

There is no defined ROW for the existing road at Whiteside Campground. Takes from this facility are defined as any disturbance within the campground boundary that is outside the existing roadbed. Under Alternatives 2 and 3, widening the road through this area takes approximately 0.01 hectare (0.02 acre) of a corner of the campground but does not impact any structures. This encroachment is minor and does not reduce the size of the normal use area. No improvements to the road are constructed in the area of this campground under Alternative 4. Alternative 4 has no impact on this site. Rehabilitation efforts under Alternatives 5 and 6 are within the existing ROW and have no impact on this site.

Avoidance Alternatives

Alternative 4 does not involve construction in the area of this campground, thereby avoiding all Section 4(f) resources use. Alternatives 5 and 6 involve rehabilitation within existing ROW in this area, thereby avoiding Section 4(f) resources use.

For Alternatives 2 and 3, moving the road to the north avoids direct impacts to the campground. This requires 0.5 kilometer (0.3 mile) of new roadway. This new alignment would create new environmental impacts, including impacts to plants and animals, visual resources, and water resources, in a previously undisturbed area. This alternative is not prudent.

For Alternatives 2 and 3, the campground could also be avoided by moving the road to the south. This requires 1.0 kilometer (0.6 mile) of new road, two crossings of Geneva Creek, a new parking area and impacts riparian areas adjacent to the creek. This new alignment would create new environmental impacts, including impacts to plants and animals, visual resources, and water resources, in a previously undisturbed area. This alternative is not prudent.

Measures to Minimize Harm

The typical section for Alternative 6 is narrower than for the other build alternatives. This minimizes the impacts to Section 4(f) resources adjacent to the roadway.

Guanella Pass Campground

Affected Environment

Guanella Pass Road currently divides this 3.9 hectare (9.6 acre), eighteen site campground into two parts, with seven campsites on the west side of the road and eleven campsites on the east side of the road. The campground includes picnic tables, tent pads, toilet facilities, and parking spaces.

Environmental Consequences

At Guanella Pass Campground, the boundary between the campground and the road is located 7.6 meters (25 feet) from the road centerline, on both sides of the road. Widening the road through this area under all build alternatives takes approximately 0.01 hectare (0.02 acre) in a strip 1.5 meters (5 feet) wide from the west portion of the campground, but does not impact any structures. The campground remains divided by the road. Walls and cut slopes for one of the switchbacks above the campground are visible.

Avoidance Alternatives

The Naylor Creek Realignment option (now dropped) would move the roadway to the west side of the campground. It would require 0.2 hectare (0.5 acre) of additional new ground disturbance and retaining walls that costs more than the proposed improvements in the area. The retaining wall and cut slopes associated with the westward alignment shift are higher on the hill above the campground, and therefore more visually intrusive. To re-establish access, one campsite is taken. Therefore, moving the roadway to the west could not avoid impacts to the campground.

Shifting the road to the east of the campground requires more than 1 kilometer (0.6 mile) of new road, a new access road to the campground, and two crossings of South Clear Creek. Also, riparian areas are impacted adjacent to the creek, and the road would go through a portion of the Mt. Evans Wilderness Area. This alternative is not prudent.

Measures to Minimize Harm

The typical section for Alternative 6 is narrower than for the other build alternatives. This minimizes the impacts to Section 4(f) resources adjacent to the roadway. New slopes will be revegetated. On the switchback that is visible from the campground, rock stain will be applied to any new rock cuts to reduce their visual impact. Rock faces will be blasted in such a way that the resulting exposed rock will have an irregular, natural looking appearance. During the pre-construction inspection, special care will be used to delineate clearing limits so that small construction adjustments can allow additional trees to be saved.

ALTERNATIVES THAT AVOID ALL SECTION 4(F) RESOURCES

Alternative 1 (No Action)

Alternative 1 leaves Guanella Pass Road in its current condition. The existing deficient characteristics of the roadway remain. This alternative does not affect any of the Section 4(f) resources.

Other Corridors

No other practical alternatives avoid all Section 4(f) resources and serve existing uses or address the purpose and need for the project.

COORDINATION

The Town of Georgetown and Historic Georgetown, Inc. have requested mitigation for visual impacts to the GSPNHLD. Mitigation has been included in the project to the extent practicable. The State Historic Preservation Officer (SHPO) initially requested more information on several historic sites. Further investigations were conducted and are included in this evaluation. The FS has agreed with the effects to the campgrounds and picnic area. The Department of the Interior (DOI) has reviewed the impacts.

The FHWA has and will continue to work closely with the FS, the DOI, Georgetown, Clear Creek County, Park County, Historic Georgetown, Inc., and the SHPO throughout this environmental process and the design phases to assure that all reasonable considerations for protection and enhancement of the Section 4(f) resources are carefully considered. To date, this coordination has taken the form of meetings, field reviews, and correspondence. Coordination meetings and field reviews will continue throughout the process. For more information on project coordination, see **Chapter VII: Project Coordination** and **Appendix A: Interagency Correspondence**.

FINDINGS

Based upon the considerations outlined in the above analysis, there is no feasible and prudent alternative to the use of land from the following Section 4(f) properties: the GSPNHLD, Mine Tailing Dumps (sites #5CC988-990), and Guanella Pass Campground. The proposed action includes all possible planning to minimize harm resulting from such use.

5. Right-of-Way

With cooperation from the FS, Clear Creek County, Park County, and the Town of Georgetown, ROW will need to be acquired for any of the build alternatives. Most of the roadway passes through public lands that would require a land transfer from the FS to the appropriate maintaining agency. Where the project passes through private property and additional ROW is needed, typically the maintaining agency will acquire these additional easements. Where possible, design and construction techniques will be used to keep the proposed work within the existing ROW. Alternatives 2 and 3 would require the largest amount of additional ROW because they involve full reconstruction for the entire length of the road. Alternatives 4 and 5 would require less ROW than Alternatives 2 and 3 because they involve either rehabilitation or no action for portions of the road. Alternative 6 would require the least amount of additional ROW among all of the build alternatives because of the decreased amount of full reconstruction, reduced roadway width, and lower design speed, all of which result in a closer match to the existing roadway and associated existing ROW.

Property acquisitions will be done in accordance with applicable provisions of the Uniform Relocation and Real Property Act of 1970 (P.L. 91-646) and the Uniform Relocation Act Amendment of 1987 (P.L. 100-17). All acquisitions consist of land only; no structures will be taken.

6. Utilities

Power poles and underground telephone lines at some locations would need to be moved under all build alternatives. Utilities would be relocated within the ROW of the new road wherever practical. The FHWA would coordinate with appropriate utility companies before reconstruction to determine the timing and details of power and telephone line relocations. The proposed improvements for any build alternative would not result in any interruptions in the existing utility services.

7. Floodplains

Affected Environment

A study was performed which included an analysis of effects to floodplains. Detailed floodplain information is contained in the report *Preliminary Hydrology & Hydraulics Report* (MK Centennial, January, 1995). Federal Emergency Management Agency (FEMA) maps and flood history were reviewed, and several hydrology methods were evaluated to estimate peak flow. Water surface profiles were generated for the 10, 50, and 100-year frequency floods using the USACE's HEC-2 Water Surface Profile computation program.

Floodplain information is available from FEMA and other sources for Clear Creek throughout the Town of Georgetown and for South Clear Creek upstream to the upper Georgetown town limits. No existing floodplain information is available for Geneva Creek or any tributaries to these three principle streams. There are no mapped or established regulated floodplains along the project alignment; therefore, the results of the hydrology study set the floodplain base flood elevations. These base flood elevations were used to determine the 100-year floodplain elevations throughout the project area.

The existing road surface elevation is below the 100-year floodplain elevation at nine locations along the road, totaling 0.72 kilometer (0.44 mile) in length. Eight of these locations are along Geneva Creek between stations 2+800 and 5+500. The other area, about 0.02 kilometer (0.01 mile) in length, is located along South Clear Creek near station 29+900. Roads existing below the floodplain elevation are prone to extreme sedimentation and road failure during extreme precipitation events.

Environmental Consequences

Roadway flood-prone areas were identified throughout the project alignment. Problems include culvert overtopping and inundation of the road in the floodplain. Reconstructed portions of the roadway would mitigate these potential flood-prone areas. Inadequate culverts would be upgraded to pass the 50-year flood at all stream crossings without overtopping the roadway. The new roadway would be constructed so that it does not cause greater than a 0.3 meter (1 foot) rise to the 100-year base flood elevation. The allowance of a 0.3 meter (1 foot) rise is consistent with FEMA floodplain policy. This 100-year base flood elevation has been identified for all the streams in critical areas along the roadway. Culverts would be developed to accommodate the 50-year flood. Bridges would be designed to withstand the 100-year flood. Culvert upgrades at creek crossings would consist mainly of corrugated steel pipe with natural bottoms.

The proposed 7th Street bridge is located outside of the 100-year floodplain.

Alternative 1

Alternative 1 leaves the roadway elevations unchanged, so the potential for flooding and washouts remain.

Alternatives 2 and 3

Under Alternatives 2 or 3, the roadway surface elevation along Geneva Creek would be raised, and any needed widening would be done on the side of the road away from the creek and upland from the floodplain. The small area near station 29+900 would be within a reconstruction area, so the roadway surface elevation would be raised here as well. Raising the roadway grade by one meter (three feet) on average for the 0.72 kilometer (0.44 mile) of encroachment length would fill into at most 0.3 hectare (0.7 acre) of land below the 100-year water surface elevation. This small amount of floodplain encroachment resulting from Alternatives 2 or 3 would not result in any risk or have any impact on human life, property, or the natural environment. There is no permanent human habitation or land suitable for cultivation along any of the streams where encroachment occurs.

Alternatives 4 and 5

The areas along Geneva Creek are within No Action and rehabilitation sections under Alternatives 4 and 5, respectively, so the roadway surface would remain below the 100-year floodplain elevation, and the risk of washouts would not change from current conditions. The last section, at approximately station 29+900, would be within a reconstruction area, so the roadway elevation would be raised.

Alternative 6

Under Alternative 6, the eight sections along Geneva Creek would be rehabilitated; therefore, the roadway surface elevation would remain below the 100-year floodplain elevation. The risk of washouts would not change from the current conditions. The last section, at approximately station 29+900, would be within a reconstruction area, so the roadway elevation would be raised.

8. Farmlands

Consultation with the Natural Resources Conservation Service (formerly the Soil Conservation Service) revealed that there are no farmlands subject to the Farmland Protection Policy Act within the Guanella Pass Road study corridor.

9. Environmental Justice

Executive Order No. 12898 addresses environmental justice in minority and low-income populations. This order is designed to concentrate on the environmental and human health conditions of minority and low-income communities in achieving environmental justice. Minimal ROW purchase and no relocations are associated with any alternative. The Guanella Pass Road improvements do not discriminate on the basis of minority or low-income populations, and none of the build alternatives would disproportionately affect minority or low-income populations.

10. Services

Affected Environment

Community Services

The following information was obtained from local emergency services to Guanella Pass Road and the surrounding areas. The information is based on a survey sent to each police, fire, ambulance, and search and rescue agency that services Guanella Pass Road. The information is used to evaluate potential effects to community services caused by each of the alternatives. Because responses were not received from each agency, the information is based only on those responses received.

Community services are provided by Georgetown, Clear Creek County, and Park County. Some of the services come from paid city and county employees and volunteers provide others.

Police Service

The Georgetown Police Department employs three staff members to provide services. They have two patrol vehicles. During the year 2000, the department responded to approximately 570 calls, with about 20 of those calls coming from Guanella Pass Road.

The Clear Creek County Sheriff's Department employs eight patrol deputies and one sergeant with nine four-wheel drive patrol vehicles and one snowmobile. The department handles about 9,000 calls per year, half of which require written reports. Department officials report only a small number of calls from Guanella Pass Road.

The Park County Sheriff's Department has nine deputies and nine vehicles. The Department handles, on average, 14,000 calls per year, responding to 2,476 during 2000. Five of the calls they responded to were along Guanella Pass Road.

Fire Service

The Georgetown Fire Department has about 30 volunteer firefighters that handle approximately 320 calls per year. The department has two pumpers, one brush truck and one command vehicle. According to fire officials, the Guanella Pass Road area does not generate a large number of calls. The number of fires in the area has remained relatively constant over the years.

The Platte Canyon Fire Protection District covers 650 square kilometers (250 square miles) within Park County including Guanella Pass Road. The District employs one administrator and has 50 volunteer firefighters to handle approximately 500 calls per year. Officials at the fire district get about six calls per year from Guanella Pass Road.

The Clear Creek Fire Authority has jurisdiction over the seven municipalities in Clear Creek County, including Georgetown, Silver Plume, Empire, Dumont, York Gulch, Idaho Springs, and St. Mary's. Of these municipalities, the Georgetown Fire Department responds to the most calls within the Authority – approximately 95 to 98 percent of all fire incidences. The Authority has two initial response vehicles, one command response vehicle, and two to four second alarm response vehicles. The Authority has eighteen initial response volunteers and one full-time staff member (chief) for initial response. Approximately 530 fire incidences were handled by the Authority in 2000. Only two to three of these calls per year are from Guanella Pass Road.

Ambulance Service

Ambulance services in Clear Creek County are provided through a staff paramedic/coordinator and about 40 volunteers. The service has six vehicles that they use to respond to calls. They handle approximately 1,400 calls per year and respond to about 400 incidences/accidents. An employee of Clear Creek County Ambulance estimates that they respond to about 25 calls per year from Guanella Pass Road.

Platte Canyon Rescue is a non-profit organization contracted by Park County to provide ambulance service to the Platte Canyon area including Guanella Pass, Kenosha Pass, Upper Rim Rock Road and Harris Park. They have ten part-time paid employees that monitor the station during the day (8:00 a.m. to 6:00 p.m.) and 30 volunteer crew members on call. They have two advanced life support ambulances and one basic life support ambulance and handle approximately 500 calls per year. Very few calls are from Guanella Pass Road.

Search and Rescue Services

The Alpine Rescue Team is a non-profit search and rescue unit that serves the Guanella Pass Road area. No information was given about their operations.

Park County's Search and Rescue unit is a non-profit volunteer organization under the wing of the Sheriff's Department. There are 35 volunteer members that handle about 50 calls per year all over Park County. The organization has six vehicles that they use to handle incidences. In 2000, they received seven calls and handled seven incidences on Guanella Pass Road.

Other Services

FS Law Enforcement Officers (LEO's) also patrol Guanella Pass Road and surrounding forest lands. One LEO from the Pike NF and one from the Arapaho NF each patrol their portions of the road approximately once a week. Primary LEO duties in the area involve checking campgrounds and picnic areas as well as monitoring dispersed recreational activities along the road including camping, hiking, off-road riding, horseback riding, fishing, and shooting.

Guanella Pass Road is maintained by Park and Clear Creek Counties, as their budget allows. The maintenance activities of the counties include snow removal, grading of the dirt and gravel areas, pothole patching, placement of new aggregate, application of $MgCl_2$ for dust control, rock removal, and replacement of culverts, signs, and delineators.

Environmental Consequences

Police, Fire, and Search and Rescue Services

Based on the number of existing emergency response calls and the projected traffic volumes for the No Action Alternative and for each of the build alternatives, it is expected that the emergency services will see an increase in calls and requests for assistance. It is not clear, however, how much of an increase can be expected. A conservative estimate would be to assume that the increase in calls is proportional to the amount of increased traffic. The increases in road safety proposed for the build alternatives will most likely result in less emergency calls per vehicle than currently exists.

Alternative 1

The number of emergency service calls for Alternative 1 (No Action) could be expected to increase 56 percent by the year 2025 based on 1995 traffic volumes.

Alternatives 2, 4, and 5

Under Alternatives 2, 4, and 5, the number of emergency service calls will increase an estimated 40 to 80 percent over no action, or 119 to 181 percent by the year 2025 based on 1995 traffic volumes. These substantial increases are partly due to the increased amount of paved roadway.

Alternative 3

The amount of emergency service calls for Alternative 3 are projected to increase 35 percent over no action, or 111 percent by the year 2025 based on 1995 traffic volumes.

Alternative 6

Alternative 6 will have the least impact of the build alternatives and increase the number of calls an estimated 20 percent over no action. Based on 1995 traffic volumes, the number of calls are forecast to increase 88 percent over the existing number by the year 2025 with Alternative 6.

Other Services

Also, increased traffic levels through Georgetown may increase the need for street maintenance on local streets in Georgetown. At certain busy times in the summer and during aspen viewing season, there is difficulty in finding parking spaces. Many people park on the town's narrow streets and this adds to the traffic congestion. Additional people in the area may increase the need for trash collection and removal and the demand for use of public toilets.

A more detailed analysis of this topic is provided in the *Guanella Pass Road Colorado Forest Highway 80 Social Impacts Technical Memorandum* (MK Centennial and Hermsen Consultants, March 1997).

11. Maintenance Cost

As with any costs that are developed in the FEIS, the maintenance costs are intended to give a relative comparison between alternatives and are not intended for county or city budget planning. The maintenance costs are developed with assumptions that may or may not be an accurate representation of actual maintenance activities at the time of project implementation.

11a. General Maintenance

Affected Environment

Guanella Pass Road currently requires substantial maintenance efforts resulting in high maintenance costs for both Park and Clear Creek Counties. The maintenance effort is particularly burdensome during the summer and fall when traffic volumes are high. During the winter, the counties experience difficulty with snow removal and storage, and drifting at the top of the pass.

Existing maintenance activities include snow removal, grading of the dirt and gravel areas, pothole patching, placement of new aggregate, application of $MgCl_2$ for dust control, rock removal, and replacement of culverts, signs, and delineators.

Environmental Consequences

All alternatives were evaluated at the same level of detail for maintenance costs. To allow for an equal comparison, this analysis assumes maintenance costs for Alternative 6 are based on the same types of surfaces (asphalt pavement and gravel) as the other alternatives to give an equal comparison.

The level of future maintenance provided for the roadway depends on traffic volumes, future surface conditions, climatic conditions, and the counties' maintenance budgets and resources. For comparison purposes, the future maintenance costs assume that the road surfaces (both gravel and paved) are maintained to a level consistent with standard recommended practices, preferred surface conditions, and projected traffic volumes.

The main maintenance items included in the evaluation of future maintenance costs consistent with standards for a gravel surface include periodic grading, application of $MgCl_2$, and replacement of gravel. The main maintenance items included for the asphalt surface include pavement sealing, patching, chip seal, and striping.

Table III-33 shows the twenty-year maintenance cost by county for all alternatives. The cost of maintenance of the road after construction of Alternative 6 is 64 percent of the cost of maintenance under Alternative 1 (No Action). Of the four build alternatives that have gravel surfaces, Alternative 5 is the least expensive to maintain, followed by Alternative 6. Alternative 5 is only less expensive because it consists of more paved surface sections than Alternative 6. Alternative 6 has roughly twice the length of unpaved surface as Alternative 5, but only costs 1.3 percent more to maintain.

Table III-33
Twenty Year Maintenance Cost Comparison by Alternative (1995 Dollars)

Alternative	Park County	Clear Creek County	Total
Alternative 1 (No Action)	$3,203,000	$6,106,100	$9,309,100
Alternative 2	$1,453,000	$3,339,900	$4,792,900
Alternative 3	$2,339,400	$5,149,100	$7,488,500
Alternative 4	$3,029,200	$3,597,300	$6,626,500
Alternative 5	$2,503,500	$3,392,800	$5,896,300
Alternative 6	$1,714,500	$4,256,800	$5,971,300
Source: Guanella Pass Road Life Cycle Cost Analysis, MK Centennial, December 1997 and Life Cycle Cost Analysis Addendum, May 2000.			

Alternative 6 reduces the maintenance cost of the gravel surfaces (compared to Alternatives 2-5) because of several factors:

- The road is narrower and requires less replacement gravel.
- The design speed is lower and reduces the amount of gravel loss and, therefore, reduces the amount of replacement gravel needed for maintenance.
- The traffic volume is lowest of the alternatives and reduces the amount of gravel loss and, therefore, reduces the amount of replacement gravel needed for maintenance.

For all alternatives, winter closure of the road will reduce the maintenance costs associated with plowing the road. Plowing on a gravel surface strips the road of gravel and increases the amount of required replacement gravel and frequency of maintenance.

Winter closure also helps preserve the surface structure (paved or gravel) by reducing the exposure of the surface to freeze-thaw cycles that result when the road is cleared of snow. The

snow acts as insulation to the road that protects it from the temperature extremes that occur between the winter days and nights. Fewer freeze-thaw cycles reduce the amount of maintenance required to repair the road.

Finally, winter closure reduces the amount of traffic on the road. Less traffic means less maintenance.

11b. Maintenance Costs of the Alternative Surface Types

The alternative surface types included in the cost evaluation are $MgCl_2$, PennzSuppress D, Perma-Zyme, Road Oyl, macadam, and recycled asphalt. These surfaces vary in strength, durability, and life cycle. Differing levels and schedules of maintenance and surface reconstruction account for differences in cost between the alternative surface types.

The costs related to maintenance for each alternative surface type was calculated using the *Guanella Pass Road Colorado Forest Highway 80 Life Cycle Cost Analysis Addendum*, the *Engineering Estimate for Alternative Surface Type Test Strips*, and *Colorado Department of Transportation (CDOT) 1996 Cost Data*. Individual county costs were averaged to determine a single unit cost per item.

Reconstruction and maintenance costs were determined on a per kilometer (per mile) basis. Table III-34 provides the per kilometer (per mile) unit cost in 1996 dollars for each item. For the purpose of this comparative analysis, a kilometer (mile) section is assumed to be 6.7 meters (22 feet) wide, 1 kilometer (1 mile) long, and 0.15 meters (0.5 feet) deep.

Table III-34
Unit Costs of Maintenance
(1996 Dollars)

Surface Type	Cost of one Reconstruction $/km ($/mi)	Annual Cost of Common Maintenance* $/km ($/mi)	Annual Cost of Periodic Maintenance** $/km ($/mi)	Cost of One Surface Replacement*** $/km ($/mi)
$MgCl_2$	$77,500 ($124,800)	$2,700 ($4,400)	$1,500 ($2,400)	$83,800 ($135,000)
PennzSuppress D	$77,500 ($124,800)	$2,700 ($4,400)	$2,800 ($4,500)	$83,800 ($135,000)
Perma-Zyme	$77,500 ($124,800)	$2,700 ($4,400)	$1,700 ($2,700)	N/A
Road Oyl	$187,500 ($301,900)	$2,700 ($4,400)	$4,300 ($6,900)	$91,900 ($148,000)
Macadam	$98,600 ($158,700)	$2,700 ($4,400)	$3,800 ($6,100)	$16,200 ($26,000)
Recycled Asphalt	$180,900 ($291,300)	$2,700 ($4,400)	$3,800 ($6,100)	$91,900 ($148,000)

*Common Maintenance includes snow removal during the winter months, and grading of the dirt, gravel, or gravel alternative areas in the summer months.
**Periodic Maintenance includes pothole patching, placement of new aggregate (gravel surface material), other maintenance such as rock removal, and the replacement of culverts, signs, and delineators as needed.
***Surface Replacements include regrading and complete replacement of the road surface.

After determining the unit costs, the costs over a twenty year period were calculated. Table III-35 represents the 20-year cost for each type of surface based on the number of reconstructions and the amount of maintenance required over a 20-year period (described in Table III-36).

Table III-35
20-Year Maintenance Cost per Kilometer (per Mile) Section
(1996 Dollars)

Surface Type	Cost of Reconstructions $/km ($/mi)	Cost of Common Maintenance $/km ($/mi)	Cost of Periodic Maintenance $/km ($/mi)	Cost of Surface Replacements $/km ($/mi)
$MgCl_2$	$77,500 ($124,800)	$54,000 ($88,000)	$25,500 ($40,800)	$251,400 ($405,000)
PennzSuppress D	$77,500 ($124,800)	$54,000 ($88,000)	$25,200 ($40,500)	$251,400 ($405,000)
Perma-Zyme	$387,500 ($624,000)	$54,000 ($88,000)	$25,500 ($40,500)	N/A
Road Oyl	$562,500 ($905,700)	$54,000 ($88,000)	$73,100 ($117,300)	$183,800 ($296,000)
Macadam	$98,600 ($158,700)	$54,000 ($88,000)	$72,200 ($115,900)	$32,400 ($52,000)
Recycled Asphalt	$180,900 ($291,300)	$54,000 ($88,000)	$72,200 ($115,900)	$91,900 ($148,000)

Table III-36
Amount of Maintenance Required Over a 20-Year Period

Surface Type	Number of Reconstructions	Years of Common Maintenance	Years of Periodic Maintenance	Number of Surface Replacements
$MgCl_2$	1	20	17	3
PennzSuppress D	1	20	9	3
Perma-Zyme	5	20	15	0
Road Oyl	3	20	17	2
Macadam	1	20	19	2
Recycled Asphalt	1	20	19	1

Table III-37 provides the total cost of each type of surface over a 20-year period per kilometer (mile). For the complete cost analysis refer to the *Lifecycle Cost Analysis of Alternative Surface Types Technical Report* (MK Centennial, September, 2002).

Table III-37
Total 20-Year Maintenance Cost per Kilometer (per Mile)
(1996 Dollars)

Surface Type	Total Cost $/km ($/mi)
$MgCl_2$	$408,400 ($658,600)
PennzSuppress D	$408,100 ($658,300)
Perma-Zyme	$467,000 ($752,500)
Road Oyl	$873,400 ($1,407,000)
Macadam	$257,200 ($414,600)
Recycled Asphalt	$399,000 ($643,200)
NOTE: The 20-year maintenance cost of a gravel-only surface, using an identical analysis, is approximately $565,700 per kilometer ($910,700 per mile).	

12. Cumulative Impacts

Cumulative impacts include the effects of past, present, and future State, tribal, local, or private actions that are reasonably certain to occur in the action area. Actions identified as possibly falling into this category with respect to the proposed project for Guanella Pass Road include past mining activity in the roadway vicinity, initial construction of Guanella Pass Road, construction of I-70 near Georgetown, widening of U.S. Highway 285, reservoir construction, power plant and power transmission line construction, campground, picnic area, and trail construction, subdivision and development of privately owned land, general population growth, and implementation of the CMS proposals.

The CDOT is currently widening U.S. Highway 285 from Tinytown Junction southwest to Foxton Road. Future plans for widening extend only to Bailey, which is 18 kilometers (11 miles) east of the Guanella Pass Road intersection with U.S. Highway 285. Because of the great distance between this project and Guanella Pass Road, no cumulative impacts associated with the U.S. Highway 285 widening project are anticipated.

The FS, the counties, Georgetown, and other stakeholders have prepared a management strategy for the Guanella Pass Road Scenic and Historic Byway. The CMS prescribes general recommendations for the entire byway as well as specific desired conditions and action items for nine separate management zones within the byway. However, the CMS is only a guidance document, not a decision document, and no funding is attached to the CMS. Therefore, it is uncertain which, if any, of the recommendations will be implemented, and in what time frame.

The Pike-San Isabel NF is scheduled to implement a mandatory self-registration permit program for its wilderness areas, including the Mt. Evans Wilderness Area. This program should be in place by the year 2003, and will allow the FS to monitor area usage and provide educational and regulatory information to visitors.

The FS is currently building a section of the Continental Divide National Scenic Trail approximately six miles to the west of Guanella Pass. The trail, when completed, will run from Canada to Mexico. The section of the trail closest to Guanella Pass Road is scheduled for completion by the year 2007.

Affected Environment

Social Environment

Community Character

The community character of Georgetown has changed over the years from a mining town in the 1860's to a recreational center for the people of Denver more recently. In 1859, the brothers George and David Griffith staked a claim at the future site of Georgetown. The population grew to 5,000 by 1876, but prosperity was fleeting and Georgetown's days as "Silver Queen" came to an end with the repeal of the Sherman Silver Purchase Act of 1893. Mines were closed and Georgetown's population shrank to a low of 300 in 1930. The current population is approximately 1,100. Construction of I-70 in the 1960's has contributed to changes in the character of Georgetown.

Traffic Volumes

The construction of I-70 in the 1960's, development of privately owned land, development of recreational resources along the road, and general population growth have contributed to traffic growth in the project area.

Population and Demographics

The population of Georgetown has fluctuated from 5,000 in 1876, to 300 in 1930, to nearly 1,100 in the year 2000. The rise and fall of mining in the area and the construction of I-70 have contributed to the fluctuations in population.

Local Economy

The economy of Georgetown has changed over the years from a mining based economy to a recreation based economy. These changes have been influenced by mining activity in the area, the development of recreational resources, and the construction of I-70. Mining has also influenced the economy of Grant.

Land Use

Forty acres of the private property at Duck Lake (Alpendorf on the Lake) has been subdivided into one-acre parcels, and three of these have been sold. Sale of additional parcels, as well as development on parcels that have been sold, could occur.

Cultural Resources

Past mining in the area resulted in the creation of several cultural resources, including the GSPNHLD, the Colorado Central Railroad Grade, the Marshall Tunnel, mine tailings dumps, and the Farwell Smelter remains. The construction of the Georgetown Forebay Dam and Reservoir and Clear Lake Dam and Reservoir created those cultural resource sites. The construction of I-70 impacted the visual character of the GSPNHLD.

Water Resources

Water Quality

Mining activities have impacted water quality in portions of the project area. Past construction of mines, roads, campgrounds, picnic areas, trails, and dams has caused erosion and sedimentation and has altered the water flow in the area and created more unvegetated areas than prior to their construction. The larger amount of exposed ground and concentration of flows has contributed to sedimentation in area waters.

Wetland and Riparian Communities

Past construction of mines, roads, campgrounds, picnic areas, trails, and dams has caused erosion and sedimentation and has altered the water flow in the area, destroying some wetland and riparian communities while creating others. In addition, mine tailings have impacted water quality, which has affected some wetland and riparian communities.

Visual Quality

Historic and modern development of communities, recreational sites, mining activities, and public works projects shape the visual environment over time. Positive and negative viewpoints regarding visual quality are often a matter of opinion.

Recreation Resources

The initial construction of Guanella Pass Road opened the recreational opportunities in this area. The construction of campgrounds, picnic areas, and trails has added to the recreation in the area. Construction of I-70 made access to recreation easier and faster for the people of Denver. General population trends have contributed increase the number of people recreating in the area.

Plants and Animals

Past construction of mines, roads, houses, campgrounds, picnic areas, trails, power plants, and dams, as well as population growth in the region, has impacted wildlife habitat in the area. In addition, forty acres of the private property at Duck Lake (Alpendorf on the Lake) has been subdivided into one-acre parcels, and three of these have been sold. Sale of additional parcels, as well as development on parcels that have been sold, could occur.

Impacts to wildlife include direct habitat loss, habitat alteration, habitat fragmentation, displacement due to human presence, and direct mortality. As human presence continues to increase in the area, impacts to wildlife will continue to increase as well.

Air Quality

Air quality is influenced by the amount of unpaved roads and traffic volumes as well as human activities that require the burning of fuels. As the population has grown on the Front Range, traffic volumes have increased both on Guanella Pass Road and on nearby roads such as I-70. Increasing nonpoint pollution sources from the Front Range and Denver areas, such as vehicle emissions, agricultural dust, and emissions from construction activities, combined with localized sources of dust and emissions along the Guanella Pass Road add to the cumulative air quality impacts.

Noise

Past construction of mines, roads, houses, campgrounds, picnic areas, trails, power plants, and dams has contributed to the increased human presence in the area. Along with human presence comes noise created by people or machinery. As human presence continues to increase in the area, the noise level would be expected to increase as well.

Hazardous Materials

Past mining activities have created the majority of the hazardous waste in the project area. The material can be spread by water (both through erosion and percolation) and by human activities such as recreation and construction. Existing hazardous materials sites are listed in **Chapter III.C.3: Hazardous Materials.**

Floodplains

Past construction of mines, roads, communities, campgrounds, picnic areas, trails, and dams has altered the water flow in the area, impacting the floodplains.

Environmental Consequences

Social Environment

Community Character

Implementation of the proposed project will contribute to the continuing change in the character of Georgetown and Grant.

Traffic Volumes

The proposed project and growing population in the area and region will influence future increases in traffic volumes. Traffic volume increases are expected to be greatest for Alternatives 2, 4, and 5; then Alternative 3, Alternative 6, and Alternative 1.

Population and Demographics

The proposed project is not expected to contribute to population trends in the area.

Local Economy

The proposed project will contribute to factors that will affect the economies of Georgetown and Grant.

Land Use

Sale of additional parcels at the private development at Duck Lake (Alpendorf on the Lake), as well as development on parcels that have been sold, could occur without the project; however, the area would likely be more attractive to many buyers if the road is improved.

No other improvements to private property are anticipated as a result of roadway improvement. No additional development at either the Tumbling River Ranch or the private property at Green Lake is reasonably certain to occur; on the contrary, it seems reasonably likely not to occur. Access to Green Lake is already provided by a paved portion of the road, and the Tumbling River Ranch owners are opposed to development.

Cultural Resources

The proposed project will affect the GSPNHLD, contributing to the ongoing changes within the historic district.

Water Quality

Water Quality

The design of the proposed project, including such enhancements as more culverts to disperse runoff, and the planned mitigation measures will help remedy some of the past water quality impacts.

Wetland and Riparian Communities

The design of the proposed project and the planned mitigation measures will help remedy some of the past wetland and riparian community impacts.

Visual Quality

The proposed project will contribute to the ongoing changes in the visual quality of the area. The proposed parking area improvements will help bring the area in compliance with the FS VQOs and will improve the visual quality of the area by relocating the parking areas further away from the road, making them less visually intrusive.

Recreation Resources

The proposed project will contribute to increases in recreation in the area.

Plants and Animals

As human presence continues to increase in the area, impacts to wildlife will continue to increase as well. The proposed project will contribute to this increase. The FHWA does not anticipate that the project will result in jeopardizing the continued existence of any federally-listed

threatened or endangered species nor will the proposed project result in requiring any sensitive species to be federally listed as threatened or endangered in the future.

Air Quality

The proposed project is expected to decrease the amount of dust from the roadway. Increased traffic will increase vehicle emissions in the area. It is uncertain whether these factors in combination with others will cause air quality to improve or degrade in the area.

Noise

As human presence continues to increase in the area, noise associated with people is expected to increase as well. However, noise levels are expected to remain low in the area.

Hazardous Materials

Cumulative impacts from the Guanella Pass Road improvements include possible disturbance of existing mine tailing piles or other hazardous materials, as detailed in **Chapter III.C.3: Hazardous Materials.**

All build alternatives will likely cause some disturbance to existing hazardous materials sites. Alternative 1 will not disturb any hazardous materials. The full reconstruction of Alternatives 2 and 3 would likely disturb 6 sites and possibly the Equator Tunnel and Silverdale/Ocean Wave Tunnel. Alternative 4, because of the greater amount of no-action segments, would likely disturb only two sites. Alternatives 5 and 6 would likely disturb five sites.

Floodplains

The design of the proposed project will help remedy some of the past impacts to the floodplains.

13. Relationship of Local Short-Term Uses Vs. Long-Term Productivity

Short-term uses are those that occur on an annual basis, while long-term productivity refers to the capability of the forest to continue producing goods and services to the end of the planning horizon. Short-term uses include firewood harvesting, all recreational uses, livestock grazing, and some land uses authorized under special use permits.

Productivity is primarily based on soil and water resources. Short-term uses that damage soils and soil-water relationships could impair long-term productivity. Forest management requirements provide for protection of long-term productivity by requiring short-term uses to mitigate impacts on soil and water resources.

Short-term increases in sediment would result from road reconstruction. Longer-term reduction of sediment will be based on the amount of pavement and slope stabilization provided by the selected alternative. Additional long-term impacts would include additional traffic and direct habitat loss from road widening. A short-term increase in wildfire potential would exist along the road shoulders following reconstruction activities and before completion of slash disposal work. A long-term risk of fire would exist due to increased roadway and area use. Air quality within the analysis area may be temporarily impacted during dry periods because of dust created by heavy equipment and vehicles. Long-term improvements in air quality would result from implementing paving alternatives.

Benefits of the project include the following: increased safety for the traveling public, improvement in air quality, reduction of side-slope erosion, additional recreational and interpretive opportunities for all roadway users, and economic benefits to residents of the Georgetown and Grant areas.

The proposed improvements are based on planning that considers present and future traffic requirements along with present and future land uses. The local short-term impacts and use of resources by the build alternatives are consistent with the maintenance and enhancement of long-term productivity for the area.

14. Irreversible and Irretrievable Commitment of Resources

Construction of any of the build alternatives for Guanella Pass Road involves a commitment of natural, physical, human, and fiscal resources. These specifically include land, earth fill, fossil fuels, labor, aggregates, and bituminous paving material.

The use of the land is generally considered an irreversible commitment of the resource. Land within the roadway prism and outside the existing disturbed area is removed from the resource base for plants and animals. This project will require a minimal amount of additional ROW. Most of the disturbed land is within an area already committed as a roadway. The use of the earth fill, fossil fuels, labor, aggregates, and bituminous paving material are generally not retrievable. These resources are not in short supply and their use will not have an adverse effect upon continued availability of these resources. An irretrievable commitment of labor and public financial resources would be used in locating, designing, and constructing the proposal.

15. Permits and Approvals Required

Construction of any of the build alternatives for Guanella Pass Road requires the following approvals:

U.S. Forest Service

1. Letter of Consent (Federal Land Policy and Management Act 36 CFR 251) – To allow the FHWA to use NF lands for road purposes.

2. Special Use Permit – To allow off-site construction related activities on NF lands.

3. Mineral Material Permit – To allow the FHWA to take borrow material from NF lands.

4. Timber Settlement Agreement – To allow the FHWA to harvest commercial timber on NF lands before disturbance. Harvesting would be conducted only to clear the area necessary for road construction.

5. A federal land transportation easement deed transfer from the FS to the counties (who maintain the road).

U.S. Fish and Wildlife Service

1. Section 7 Consultation (Endangered Species Act 50 CFR 402) – To ensure that the action taken would not jeopardize the continued existence of threatened or endangered species, or result in the destruction or modification of critical habitat.

U.S. Army Corps of Engineers

1. 404 Permit (CWA 33 CFR 320) – to allow the FHWA to discharge dredged or fill material into waters of the U.S., including wetlands.

Colorado Department of Public Health and Environment

1. 401 Certification – To certify that any activity requiring a federal license or permit that may result in any discharge into waters of the U.S. would not cause or contribute to a violation of state surface water quality standards.

2. NPDES Permit – To allow discharge of storm water from projects 2 hectares (5 acres) or more in area to state waters. In March 2003, the permit would be needed for 0.4 hectares (1 acre) or more. A construction dewatering permit and an authorization for a temporary increase in turbidity also would be needed.

D. ENVIRONMENTAL IMPACTS OF WINTER CLOSURE

The quantitative impacts to the environment as a result of closing Guanella Pass Road during the winter season have not yet been determined. Beneficial and adverse impacts that may occur fall into the categories of wildlife resources, wetland and riparian resources, recreational resources, and ROW.

The following is a summary of anticipated environmental impacts (adverse and beneficial) if winter closure is implemented:

- Winter closure would likely reduce direct and indirect impacts on the winter habitat of general wildlife including bighorn sheep, white-tailed ptarmigan, Canada lynx, and wolverine.

- Winter closure would reduce direct and indirect impacts on the wetland, riparian, and aquatic resources.

- Current parking facilities in the proposed locations of the roadway closure will be expanded. It is estimated that at least 35 spaces are needed at Naylor Lake (assumed Clear Creek County closure point), and approximately 10 spaces for vehicles as well as four spaces for vehicles with trailers will be needed near the Duck Creek picnic area (assumed Park County closure point).

- Property acquisitions to obtain additional ROW from the Pike and Arapaho NFs may be necessary to provide space for the parking demand during months of roadway closure.

- Winter closure would force recreational users to park at closure points and walk, ski, or snowmobile on the road to reach their destination. This may have an effect on the desire of people to recreate in the area and impact tourism income to the Town of Georgetown.

- Recreation and associated impacts in areas immediately adjacent to the parking areas would likely increase. Areas farther from the parking lot would likely see a decrease in winter recreational use.

- The option for winter closure affects the overall maintenance costs. A winter closure eliminates snow plowing in the section of closure. Currently, Park County and Clear Creek County annually spend about $2,200 and $13,700, respectively, on snow plow operations on Guanella Pass Road.

- Plowing snow on a gravel road removes some of the surface. Eliminating the need for snow plowing would result in a reduction in gravel loss, manpower hours, and equipment usage. Consequently, maintenance costs would be reduced.

E. COMPARISON OF ALTERNATIVES TO THE PROJECT OBJECTIVES

- The purpose of the Guanella Pass Road improvement project is based on the need to balance transportation needs and roadway maintenance needs with the sensitive nature of the environment. The project objectives are based on known problems and concerns related to Guanella Pass Road and developed through the public scoping process. Table III-38 identifies the project objectives as discussed in **Chapter I: Purpose and Need**. Table III-39 states whether or not each project objective is addressed by each alternative. Each alternative is discussed below with respect to the project objectives.

- ***Alternative 1 (No Action Alternative)*** addresses Project Objective VIII and partially addresses Project Objective VII.

- ***Alternative 2*** addresses Project Objectives I, II, III, IV, V, VI, and VII, and partially addresses Project Objective VIII.

- ***Alternative 3*** addresses Project Objectives I, II, III, V, and VI, and partially addresses Project Objectives IV, VII, and VIII.

- ***Alternative 4*** partially addresses all the project objectives; however, it does not fully address any of the project objectives.

- ***Alternative 5*** addresses Project Objectives III and V, and partially addresses Project Objectives I, II, IV, VI, VII and VIII.

- ***Alternative 6*** addresses Project Objectives I, III, and V, and partially addresses Project Objectives II, IV, VI, VII, and VIII. (Alternative 6 addresses Project Objective I to a lesser extent than the other alternatives, and only if the management responsibilities discussed in **Chapter II: Alternatives** are enforced.)

Table III-38
Objectives of the Guanella Pass Road Improvement Project

Transportation
I. Provide a roadway width and surface capable of accommodating year 2025* traffic volumes.
II. Improve safety by providing consistent roadway geometry and providing reasonable protection from unsafe conditions.
III. Accommodate and control access to Forest Service facilities located along the road.
Maintenance
IV. Reduce the anticipated maintenance costs to the counties (and town**) maintaining the road.
V. Repair roadway drainage problems.
Environmental
VI. Repair existing unvegetated slopes.
VII. Avoid, minimize, or mitigate adverse impacts to the environment by considering key issues identified through the public and agency involvement process.***
VIII. Maintain the rural and scenic character of the road.
** Year 2015 traffic volumes (used in the DEIS) have been revised to year 2025 traffic volumes to show the 20-year traffic projections, based on the estimated project completion date.* *** Added after issuance of DEIS.* **** Key Issues for this project were identified as: Social Environment, Water Resources, Visual Quality, Recreational Resources, Plants and Animals, and Construction Impacts.*

Table III-39
Project Objective Status by Alternative

Project Objective	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
I.	N	Y	Y	P	P	Y
II.	N	Y	Y	P	P	P
III.	N	Y	Y	P	Y	Y
IV.	N	Y	P	P	P	P
V.	N	Y	Y	P	Y	Y
VI.	N	Y	Y	P	P	P
VII.	P	Y	P	P	P	P
VIII.	Y	P	P	P	P	P

Key:
Y = Yes; the Alternative addresses the Project Objective.
N = No; the Alternative does not address the Project Objective.
P = The Alternative partially addresses the Project Objective.

1. Objective I: Provide a Roadway Width and Surface Capable of Accommodating Anticipated 2025 Traffic Volumes.

Alternative 1 does not provide a roadway width and structural section capable of accommodating anticipated year 2025 traffic volumes.

Alternative 2 provides a roadway width and structural section capable of accommodating anticipated year 2025 traffic volumes. Improving the roadway surface and widening the road meets the structural and operational standards requirements for the expected traffic volume.

Alternative 3 provides a roadway width and structural section capable of accommodating anticipated year 2025 traffic volumes.

Alternative 4 partially provides a roadway width and structural section capable of accommodating anticipated year 2025 traffic volumes. The sections that are reconstructed and paved accommodate the projected traffic; however, the sections left unchanged do not accommodate expected traffic. These unimproved sections are deteriorating and will not be in good driving condition by year 2025 without continued maintenance activities. These sections are not widened and would impede traffic flow.

Alternative 5 partially provides a roadway width and structural section capable of accommodating anticipated year 2025 traffic volumes. The sections that are reconstructed and paved accommodate the projected traffic. However, the sections that are rehabilitated are not widened, the shoulder width in the rehabilitated sections is less than desired, and vehicles traveling in opposing directions may be required to slow down to pass each other.

Alternative 6 provides a roadway width and structural section capable of accommodating anticipated 2025 traffic volumes only if the FS, Clear Creek County, Park County, and the Town of Georgetown manage the vehicle size allowed on Guanella Pass Road, restrict commercial truck traffic, and manage the corridor land use and development to maintain the status of the road as a rural local road.

2. Objective II: Improve Safety by Providing a Consistent Roadway Geometry and Providing Reasonable Protection from Unsafe Conditions.

Alternative 1 does not improve the safety of the roadway and does not provide consistent roadway geometrics. Existing safety deficiencies will become more of a danger as traffic volumes increase. Driving surface will continue to deteriorate, possibly at a greater rate as traffic increases.

Alternative 2 and Alternative 3 improve the safety of the roadway by widening the road, providing consistent design and engineered geometrics, improving sight-distance, eliminating or reducing ice flows and other problems related to poor drainage, installing guardrail, and providing vehicle pullouts. Alternative 2 and Alternative 3 also provide consistent roadway geometrics. The entire road is reconstructed to a standard cross section 7.2 meters (24 feet) in width.

Alternative 4 partially improves the safety of the roadway. The sections that are reconstructed and paved (51 percent) improve the roadway the same as Alternative 2 and Alternative 3. The remaining sections are left unchanged, and existing safety hazards in these sections are not addressed. Alternative 4 provides consistent roadway geometrics in the reconstructed sections

only. Approximately 49 percent of the road sections of the roadway are left unchanged with a varying width of 6.6 meters and 7.2 meters (22 – 24 feet).

Alternative 5 partially improves the safety of the roadway. The sections that are reconstructed and paved (51 percent) improve the roadway the same as Alternative 2 and Alternative 3. The remaining sections are rehabilitated within the existing width. This includes safety improvements such as eliminating or reducing ice flows and other problems related to poor drainage. Alternative 5 provides consistent roadway geometrics in the reconstructed sections only. The safety hazards related to poor sight-distance and roadway geometry are not addressed in the rehabilitated sections. Approximately 51 percent of the road is reconstructed to a standard cross-section 7.2 meters (24 feet) in width. The remaining sections of the roadway are rehabilitated to the existing width, which varies between 6.6 meters and 7.2 meters (22–24 feet). Minor template corrections are made to the pavement and gravel during resurfacing.

Alternative 6 partially improves the safety of the roadway. The sections that are reconstructed (37 percent) improve the roadway similarly to Alternative 3 (although Alternative 6 is narrower). The remaining sections are rehabilitated (63 percent) within the existing width. The reconstructed sections provide consistent geometry, improved sight distances, and fully address drainage problems. Alternative 6 also provides improved rockfall mitigation, mitigation of roadside hazards, installation of guardrail, and provision for vehicle pullouts. The rehabilitation sections partially address the drainage and ice flow problems as well as the safety concerns related to poor sight distance, roadway geometry, and roadside hazards.

3. Objective III: Accommodate and Control Access to Forest Service Facilities Located along the Road.

Alternative 1 does not accommodate and control access to FS facilities located along the road.

Alternatives 2 and 3 accommodate and control access to FS facilities located along the road.

Alternative 4 partially accommodates and controls access to FS facilities located along the road. The sections that are reconstructed accommodate and control access, the remaining sections do not.

Alternative 5 accommodates and controls access to FS facilities located along the road.

Similar to Alternatives 2, 3, and 5, Alternative 6 accommodates and controls access to FS facilities located along the road. The extent to which any of the build alternative accommodates and controls access to FS facilities will be addressed during design reviews with the FS and other agencies.

4. Objective IV: Reduce the Anticipated Costs to the Counties of Maintaining the Road

Initially, the reconstructed gravel/alternative surface sections do not require as much maintenance as is currently needed. However, as the surface deteriorates (faster than a paved surface), the maintenance costs will begin to increase, possibly to a similar level as is needed for the existing gravel surface.

The paved reconstruction sections of the roadway will reduce maintenance costs associated with a poor sub-grade or sub-base including potholes and pavement cracking. The gravel/alternative surface reconstruction sections will reduce maintenance costs associated with excessive gravel loss on steep sections (greater than 9 percent), washboarding, and rutting.

The rehabilitated roadway surface (paved or gravel) provides substantially less service life than the reconstructed sections. The maintenance cost of the rehabilitated gravel/alternative surface sections is initially decreased (compared to no action), but as the gravel/alternative surface begins to deteriorate, the cost of maintenance increases. The rehabilitated paved and chip seal surface sections require similar maintenance activities as the paved reconstruction sections.

Alternative 1 (No Action) does not reduce the cost incurred by the counties in maintaining the road. Maintenance costs may increase as traffic increases.

Alternative 2 reduces the cost incurred by the counties in maintaining the road. Reconstructing the entire road replaces the deteriorated roadway surface. Paving the road eliminates the gravel surfaced sections that are expensive to maintain. The cost of maintenance for Alternative 2 over 20 years is only 51 percent of the cost of maintenance for Alternative 1.

Alternative 3 slightly reduces the cost incurred by the counties in maintaining the road. Reconstructing the entire road replaces the deteriorated roadway surface. Initially, the gravel surfaced sections do not need as much maintenance as the existing gravel surface sections. However, as the gravel surface deteriorates the cost of maintenance will increase. The cost of maintenance for Alternative 3 over 20 years is 80 percent of the cost of maintenance for Alternative 1.

Alternative 4 partially reduces the cost incurred by the counties in maintaining the road. The sections that are reconstructed and paved reduce the cost of maintenance to these sections. However, approximately 15 percent of the roadway remains with the existing gravel surface and the maintenance costs for these sections do not decrease. The cost of maintenance for Alternative 4 over 20 years is 71 percent of the cost of maintenance for Alternative 1.

Alternative 5 partially reduces the cost incurred by the counties in maintaining the road. The sections that are reconstructed and paved reduce the cost of maintenance to these sections. The rehabilitated roadway sections provide substantially less service life than the reconstructed sections. Approximately 15 percent of the roadway is rehabilitated with a gravel surface which requires more frequent maintenance than a paved surface. The maintenance cost for the rehabilitated sections initially decreases but as the gravel surface deteriorates the cost increases. The cost of maintenance for Alternative 5 over 20 years is 63 percent of the cost of maintenance for Alternative 1.

Alternative 6 partially reduces the cost incurred by the counties and town to maintain the road. The entire road surface is reconstructed or rehabilitated. The cost of maintenance for Alternative 6 over 20 years is 64 percent of the cost of maintenance for Alternative 1. For further details on Maintenance/Costs, see **Chapter III.C.11: Maintenance Cost**.

5. Objective V: Repair Roadway Drainage Problems

Alternative 1 does not repair roadway drainage problems.

Alternative 2 and Alternative 3 completely repair the roadway drainage problems along the entire road. As part of the reconstruction, wider ditches and additional culverts are included.

Alternative 4 repairs the roadway drainage problems only in the reconstructed sections. Approximately 51 percent of the road is reconstructed, which includes wider ditches and additional culverts. Approximately 49 percent of the road remains as it is with no drainage improvements performed.

Alternative 5 repairs most roadway drainage problems throughout the entire road, although drainage repairs are more limited in the rehabilitation sections. Both the reconstruction and rehabilitation includes wider or reshaped ditches and additional culverts.

Alternative 6 repairs most roadway drainage problems throughout the entire road, although drainage repairs are limited in rehabilitated sections. The reconstruction segments typically provide wider ditches and address drainage problems better than the rehabilitation segments. The reconstructed sections will help to prevent sub-grade problems related to poor drainage by repairing ditches, flattening drainage slopes, reducing the roadway grade, and adding additional drainage features.

Both the reconstruction and rehabilitation sections include reshaped ditches and additional culverts. Because Alternative 6 has less reconstruction than Alternatives 2-5, there are fewer opportunities to repair roadway drainage problems.

6. Objective VI: Repair Existing Unvegetated Slopes

Alternative 1 does not repair existing unvegetated slopes.

Alternative 2 and Alternative 3 repair existing unvegetated cut slopes in the project corridor. Existing barren slopes within the project limits are reconstructed to promote vegetation. The slopes are revegetated with native plants. All slopes are graded and revegetated using salvaged topsoil to promote revegetation with native plants.

Alternative 4 partially repairs the existing unvegetated slopes. Slopes along the reconstruction sections are graded and revegetated using salvaged topsoil to promote revegetation with native plants. Existing barren slopes within the construction limits are reconstructed to promote vegetation in these sections. The remaining sections of roadway are left unchanged and unvegetated slopes are left unrepaired.

Alternative 5 partially repairs the existing unvegetated slopes. Slopes along the reconstruction sections are graded and revegetated using salvaged topsoil to promote revegetation with native plants. In the rehabilitated portions, the slopes are revegetated only to the extent possible without reconstructing the slope.

Alternative 6 partially repairs the existing unvegetated slopes. Slopes in the reconstructed sections are graded and revegetated using salvaged topsoil to promote revegetation with native plants. The slopes in the rehabilitation sections will be evaluated on a site-by-site basis by the FHWA, FS, and County or Town personnel to determine if it is feasible to repair these sections as part of the project.

7. Objective VII: Avoid, Minimize, or Mitigate Adverse Impacts to the Environment by Considering Key Issues Identified Through the Public and Agency Involvement Process

Alternative 1 does not reduce the adverse impact the road has on the natural environment and does not achieve the direction in the 1997 revision of the FS Land and Resource Management Plan.

Alternative 2 considers the key issues and avoids, minimizes, or mitigates the adverse impacts the road has on the natural environment. This objective is accomplished by paving and reconstructing the entire road. Paving the road eliminates the existing dust problems. Sedimentation and erosion are reduced by eliminating the gravel sections of the roadway and improving the embankments and cutslopes. Reconstruction and revegetation of the slopes along the entire length of the roadway reduce long-term erosion and sedimentation.

Alternative 3 does not fully address the adverse impacts the road has on the natural environment. There is a temporary reduction in dust; however, as the new gravel deteriorates, the dust and road-surface erosion will increase. Reconstruction and revegetation of the slopes along the entire length of the roadway reduce long-term erosion and sedimentation.

Alternative 4 does not fully address the adverse impacts the road has on the natural environment. The 51 percent of the roadway that is reconstructed and paved reduces the existing dust problem. In addition, the section of the roadway that is reconstructed includes improving the existing embankment and cutslopes, which reduces long-term erosion and sedimentation. The remaining 49 percent of the roadway that is not improved continues to experience dust problems (in the gravel sections), erosion, and sedimentation.

Alternative 5 does not fully address the adverse impacts the road has on the natural environment. The 51 percent of the roadway that is reconstructed and paved reduces the existing dust problem. In addition, the section of the roadway that is reconstructed includes improving the existing embankment and cutslopes, which reduces long-term erosion and sedimentation. Although the gravel sections are rehabilitated and new gravel is laid, the new gravel will eventually deteriorate, increasing dust and road-surface erosion.

Alternative 6 fully considers the key issues identified through the public and agency involvement process and responds to the input received from the DEIS (see **Chapter I.B.4: Development of a New Alternative**). The selection of surface types have sought to minimize road surface erosion. In particular, hardened surfaces were selected where streams encroach on the roadway. However, Alternative 6 does not fully address the adverse impact that the existing road has on the natural environment. The gravel/alternative surfaces do not necessarily provide long-term reduction of dust and road surface erosion, and the increased amount of rehabilitation in Alternative 6 does not provide complete repair of drainage problems. These impacts are balanced by the benefits gained by:

- A decrease in disturbance to previously undisturbed areas (narrower roadway width).
- A decrease in reconstruction areas.
- A design that permits the road to more closely follow the existing road (changes in functional classification, design speed, and design vehicle).

- A decrease in visual impacts to Leavenworth Mountain.
- A decrease in expected traffic growth.

8. Objective VIII: Maintain the Scenic and Rural Character of the Road

Alternative 1 does not change the existing scenic and rural character of the road.

Alternative 2 provides a more comfortable driving surface and experience for the road user, but changes the existing scenic and rural character of the road by adding new pavement. Some attributes of the rural and rustic character of the roadway are lost through minor widening, new pavement, and roadway reconstruction. However, the roadway will remain a rural road for the following reasons: there is no possibility for development on most of the surrounding land, the existing shoulders and ditches will be revegetated up to the edge of the pavement, and the design includes a low design speed and a narrow roadway width. The scenic quality of the road will be changed by Alternative 2 through removal of unvegetated cuts and the reduction of dust haze in the corridor.

Alternative 3 partially maintains the existing character of the roadway by reconstructing the pavement and gravel sections with the existing surface type. However, the roadway is more open because of the added shoulders and loses some of its rural character while maintaining its high scenic quality.

Alternative 4 partially loses the existing character of the roadway by reconstructing several sections with a new pavement surface. In these areas the roadway is more open because of the added shoulders and loses some of its rural character, but maintains high scenic quality. The remainder of the road is left unchanged and these areas maintain the scenic and rural character of the road.

Alternative 5 partially loses the existing character of the roadway by reconstructing several sections with a new pavement surface. In these areas the roadway is more open because of the added shoulders and thus loses some of its rural character, but maintains high scenic quality. The remainder of the road is rehabilitated with some widening. These areas partially lose some of the rural character of the road, but maintain high scenic quality.

Alternative 6 partially maintains the existing character of the road by not increasing the amount of pavement by a large margin (48 percent existing asphalt pavement versus 56 percent new asphalt pavement) (see Table II-4 for comparison to other alternatives). The roadway loses some of its rural character in the full reconstruction sections, but maintains a high scenic quality overall. The new functional classification and design criteria allow the road to more closely match the existing platform of the road, preserving more of the existing roadside character. The decreased length of reconstruction segments, along with the increased length of rehabilitation segments, cause less disturbance outside of the existing roadway and help to maintain the scenic and rural character of the road.

F. SUMMARY OF ENVIRONMENTAL IMPACTS

A summary of the environmental impacts of the studied alternatives is presented in Table III-40. Please refer to the specific sections within the document for details of impacts to each resource.

G. ISSUES ADDRESSED FOR CLEAR CREEK COUNTY AND THE TOWN OF GEORGETOWN

1. Issues

After the DEIS was published, representatives for Clear Creek County and the Town of Georgetown expressed the need for the FHWA to address specific issues regarding the proposed improvements to Guanella Pass Road. These were addressed within the SDEIS based on the best information available. Park County has provided the FHWA with issues to address regarding the local dude ranch. Park County has informally agreed that their issues will be addressed as Clear Creek County and Georgetown issues are addressed. The County and Town issues are presented below, accompanied by brief explanations of how each was addressed by the introduction of Alternative 6 in the SDEIS.

1a. Clear Creek County

Affordability of maintenance

Issues such as maintenance costs are shown to be lower with Alternative 6 than the No Action Alternative because of the longer life expectancy of the improved roadway.

Safety issues and mitigation strategies

Safety issues would be addressed under Alternative 6, although the correction of safety problems would not be as extensive as for Alternatives 2, 3, and 5.

Correction of existing environmental problems

Existing environmental problems throughout the roadway corridor such as dust, sedimentation, slope erosion, and roadside drainage are addressed by Alternative 6. While environmental impacts are reduced for Alternative 6, improvements to water quality will not be as great under Alternative 6 as Alternatives 2-5.

Preservation of the rural and rustic nature of the existing roadway

Preservation of the rural and rustic nature of the roadway is better maintained under Alternative 6 than Alternatives 2-5 because of the proposed alternative surface types, rehabilitation of a greater amount of the roadway, a narrower width, and closer adherence to the existing alignment.

Impacts to the environment if no action is taken / Water quality along the roadway if the existing surface types remain / Water quality along the paved sections of the roadway

Existing environmental problems throughout the roadway corridor such as dust, sedimentation, slope erosion, and roadside drainage would remain if no action is taken, and would likely deteriorate over time. The use of gravel alternative surfaces in Alternative 6 will improve water quality by reducing the sedimentation and erosion of the road surface that is currently occurring on the gravel portions of the road.

Table III-40
Summary of Environmental Impacts

	Alternative 1 (No Action)	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6 (Preferred Alternative)
Amount of Reconstruction, Rehabilitation, and Paving	0% reconstruction 0% rehabilitation 48% paved 52% dirt/gravel	100% full reconstruction 0% rehabilitation 100% paved 0% gravel	100% full reconstruction 0% rehabilitation 48% paved 52% gravel	51% full reconstruction 0% rehabilitation 86% paved 14% dirt/gravel	51% full reconstruction 49% rehabilitation 86% paved 14% gravel	37% reconstruction (18% light,19% full) 63% rehabilitation 56% paved, 14% gravel 30% alternative surface type (macadam preferred)
1. Social Environment						
Community Character	Anticipated change in community character directly proportional to the increase in traffic volume. Traffic will increase with or without the road project, although traffic will increase more under the build alternatives. See Traffic Volume section below.					
Roadway Width (includes travel lanes and shoulders)	5.5-7.2 meters (18-24 feet)	7.2 meters (24 feet)	7.2 meters (24 feet)	Reconstructed areas: 7.2 meters (24 feet) No Action Areas: 5.5-7.2 meters (18-24 feet)	Reconstructed areas: 7.2 meters (24 feet) Rehabilitated Areas: At least 7.2 meters (24 feet)	6.6 meters (22 feet)
Traffic Volume	56% increase over 1995 traffic volume at the summit in 2025.	40-80% increase over year 2025 No Action traffic volumes at the summit.	35% increase over year 2025 No Action traffic volumes at the summit.	40-80% increase over year 2025 No Action traffic volumes at the summit.	40-80% increase over year 2025 No Action traffic volumes at the summit.	20% increase over year 2025 No Action traffic volumes at the summit.
Population and Demographics	No impact anticipated.					
Local Economy	Potential enhancements to the local economies such as increased taxable retail sales, increased employment, expanded recreational services, and more year-round visitor activity. Enhancement proportional to increase in traffic volume. See Traffic Volume section above.					
Land Use and Consistency with Local Plans	No impact.	An increase in demand for services such as food and gas is expected, and may lead to changes in land use development. Improved access to private land resulting from alternatives may encourage development.				Residential and commercial land use development and local plan management will need to be monitored by the local agencies to maintain the road's functional classification as a rural local road.
Cultural Resources	No impact.	No direct impacts to the cultural resources are anticipated for any build alternative. May impact the visual quality of the GSPNHLD.				No direct impacts to the cultural resources are anticipated for any build alternative. Alternative 6 may impact the visual quality of the GSPNHLD. However, the impact is to a lesser extent than Alternatives 2-5, because Alternative 6 consists of a narrower roadway width.
Traditional Cultural Properties	No impact anticipated.					
2. Water Resources						
Water Quality	Continued sedimentation impact to existing water resources.	Will improve existing conditions that degrade water quality, such as eroding roadway ditches, shoulders, and embankments. Impacts to water quality are proportional to the amount of hardened surfacing, opportunity to correct existing erosion problems, and potential erosion from new disturbance. Alternative 2 provides the most effective remedy of the build alternatives, followed by Alternative 6 and then by Alternatives 5, 4, then 3. See Table III-9 – Comparison of Alternatives by Water Quality-Related Roadway Characteristics for more information on water quality related characteristics.				
Wetland and Riparian	Continued sedimentation impact to existing wetlands.	Drainage improvements to the roadway are expected to enhance wetland areas by controlling sedimentation, runoff, and erosion potential. The amount of positive impact is proportional to the amount of sediment reduction as described above.				
Total Direct Wetland Impact hectares (acres)	Not quantified, but continued impacts occur due to sedimentation and maintenance activities on gravel portions of road.	2.96 (7.32)	2.96 (7.32)	0.76 (1.9)	0.76 (1.9)	0.28 (0.71)

Table III-40
Summary of Environmental Impacts

	Alternative 1 (No Action)	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6 (Preferred Alternative)
3. Visual Quality						
Visual	No change from the existing visual character. Dusty conditions along the gravel sections continue to lower the visual quality. Unvegetated slopes are not repaired.	Changes to visual character are proportional to the amount of widening and the amount of reconstruction. See the Amount of Reconstruction, Rehabilitation, and Paving section above. Changes to visual character expected from the minor realignments for all build alternatives. The changes in visual character are related to the view from the road for the driver and also the view of the road. Retaining walls used to stabilize slopes for Alternatives 2-5 will detract from the visual quality of the roadway.				The amount of roadway widening under Alternative 6 is less than Alternatives 2-5. The narrower roadway width for Alternative 6 reduces the amount of retaining wall needed, and therefore reduces the impact of retaining wall on the visual character of the road. The reclassification of the road to a rural local road, the lower design speed, and the new design vehicle allow Alternative 6 to more closely follow the existing alignment. These design changes allow Alternative 6 to maintain more of the existing rustic character of the road. The visual impact from the minor realignments is less for Alternative 6 because of the reduced cross section. Alternative 6 provides the greatest amount of rehabilitation of the build alternatives and better maintains the character of the road.
		Unvegetated slopes are repaired, enhancing the visual quality of the roadway corridor. High traffic volumes on gravel roads result in very dusty conditions, thus lowering the visual quality along the roadway. The extent to which dust becomes a factor is dependent on the amount of reconstruction, rehabilitation, and paving, and the increase in traffic for each alternative. Alternative surface types for gravel sections of the road will help to reduce air-borne dust and retain some of the rustic character of the road. In addition, a coarse chip seal may be used to give the paved sections a more rustic character. See **Chapter II.B.6a: Surfacing Options** for more information. Retaining wall, slope treatment, and guardrail designs will be incorporated into all build alternatives with the intent of maintaining the rustic character of the roadway. See **Chapter II.G.1: Retaining Wall Design and Slope Treatments** and **Chapter II.G.3: Guardrail Design and Materials** for more information.				
4. Recreational Resources						
Recreational Activities	Recreational use is expected to increase proportional to the increase in traffic volume. See Traffic Volume section above. Increased recreational use creates more pressure for dispersed use of the forests. A detrimental impact on the recreational experience for some users may occur as a result of more users. Increased recreational use increases the need for parking in Georgetown and along the road. Potential winter closure of Guanella Pass Road may impact the recreational use of the area by moving the concentration of activity closer to the closure parking areas. See Chapter II.E.3: Winter Closure for additional information. Areas farther away from the parking lots will likely see a decrease in winter recreational use. Recreationalists will be farther away from their destinations and this may create a perceived inconvenience.					
Pedestrian and Bicyclists	No changes made to improve the existing conditions. Dust, narrow road width, poor sight distance, and increasing traffic will continue to adversely affect pedestrians and bicyclists.	Improved sight distance and additional roadway width along the reconstructed sections of the road improves safety for pedestrians and bicyclists. Dust reduction is directly proportional to the increased length of paved sections. Pedestrians and bicyclists may be negatively impacted due to the increase in traffic volumes for each alternative. See Traffic Volume section above.				Alternative 6 traffic volumes will be less than Alternatives 2-5. See Traffic Volume section above. The roadway width is narrower than Alternatives 2-5, and this may make it more difficult to share the road with pedestrians and bicyclists. Dust levels will remain high on the gravel portions of the roadway, but this can be reduced by dust suppressants.
5. Plants and Animals						
Wildlife – Direct Effects (proportional to habitat loss)	No impact.	Full reconstruction alternatives would have the most impact.		Alternatives 4 and 5 have about half as much reconstruction as Alternatives 2 and 3.		Alternative 6 has less reconstruction than Alternatives 2-5.
Wildlife – Indirect Effects (proportional to traffic volume and speed)	Least impact.	Most impact.	Less effect than Alternatives 2, 4, or 5.	Impact similar to Alternative 2.		Less impact than Alternatives 2-5 due to lower traffic volume and lower speed.
Total Boreal Toad Habitat Disturbance hectares (acres)	0 (0)	3.98 (9.7)	3.98 (9.7)	2.13 (5.22)	2.13 (5.22)	1.70 (4.18)
Canada Lynx Findings (preliminary recommendations)	May affect, likely to adversely affect. Potential effects are mainly related to traffic volume and speed, and would be highest under Alternatives 2, 4, and 5, less under Alternative 3, then Alternative 6, and least under Alternative 1.					

Table III-40
Summary of Environmental Impacts

	Alternative 1 (No Action)	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6 (Preferred Alternative)
Fish Habitat	No changes made to improve the existing conditions. Sedimentation problems continue.	Drainage improvements will greatly reduce sedimentation problems. Fish habitats likely to improve after construction. However, pre-existing water quality issues will continue to pose a threat to the fish habitats. With the installation of natural bottom culverts, fish passage will improve after construction. Alternative 2 provides the most effective solution to improving the existing conditions, followed by Alternative 6 and then by Alternatives 5, 4, and 3. The impacts to fish habitat are proportional to the amount of hardened surfacing, opportunity to correct existing erosion problem areas, and potential erosion from new disturbance.				
6. Construction Impacts						
General Construction	Maintaining agencies will have to perform construction and/or repair activities above and beyond normal maintenance periodically as the road continues to deteriorate.	Construction impacts such as increased traffic delays, construction noise, and habitat disruption are the same for Alternatives 2 and 3. Construction impacts are less for Alternative 5 and Alternative 4 due to the decreased amount of reconstruction associated with these alternatives. Alternative 6 has the least impact because it has the least reconstruction. Haul loads through the project area are proportional to the amount of reconstruction proposed for each of the build alternatives. Road damage along haul routes is expected for all of the build alternatives. Traffic delays are expected for each of the build alternatives.				
Construction Cost (2002 dollars)	$0 (Does not include County construction costs to maintain the road as it continues to deteriorate.)	$46.1 million	$44.6 million	$29.2 million	$35.9 million	$28.9 million
7. Other Resources						
Air Quality	No change from the existing air quality conditions. Dust in gravel sections continues to impact air quality.	Dust is reduced directly proportional to the increased length of hardened surfacing (pavement or macadam), improving the air quality. See Amount of Reconstruction, Rehabilitation, and Paving section above. The greatest improvement is seen under Alternative 2, followed by Alternatives 4, 5, and 6. No long-term improvements are seen under Alternative 3. Dust suppressants will help to decrease the air-borne dust problem on the gravel road sections of Alternatives 3-6.				
Noise (at projected year 2025 traffic volumes)	No residential noise impacts requiring noise abatement are expected. The decibel increase is associated with future projected traffic.					
	0-3 dB(A) increase over existing levels at 60 m (200 ft) from road.	3-5 dB(A) increase over existing levels at 60 m (200 ft) from road.	1-3 dB(A) increase over existing levels at 60 m (200 ft) from road.	3-5 dB(A) increase over existing levels at 60 m (200 ft) from road.	3-5 dB(A) increase over existing levels at 60 m (200 ft) from road.	1-3 dB(A) increase over existing levels at 60 m (200 ft) from road.
Hazardous Material	No impact.	Disturbance to hazardous material sites 3, 7-9, 12, and 13. Potential impacts to Equator tunnel and Silverdale/Ocean Wave tunnel.		Disturbance to hazardous material sites 12 and 13.	Disturbance to hazardous material sites 7-9, 12, and 13.	
Section 4(f) impacts Hectares (acres)	0 (0)	0.13 (0.33)	0.13 (0.33)	0.01 (0.03)	0.03 (0.07)	0.03 (0.07)
Utilities	No impact.	Power poles and underground telephone lines would need to be moved under all build alternatives.				
Floodplain	No further impacts over current conditions anticipated.					
Farmlands	No impact anticipated.					
Environmental Justice	No impact anticipated.					
Services	The demand for local services, including police, fire, ambulance, search and rescue, and trash removal is expected to increase in proportion to the increase in traffic volume for each alternative.					
Relocation	No impact anticipated.					
Maintenance Cost (estimated over 20 years)	$9.3 million	$4.8 million	$7.5 million	$6.6 million	$5.9 million	$6.0 million
Secondary Impacts	Increased traffic will create a demand for commercial services such as restaurants, shopping, and gasoline, as well as for community services such as public restrooms and trash removal. The demand for parking in Georgetown will increase directly proportional to increased traffic volumes. The increased use of the road may reduce the perception of the corridor as a tranquil environment as private land owners develop properties for recreational or other uses.					

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Effect on wildlife travel corridors if improvements are made to the roadway / Solutions to minimize impacts to wildlife such as a higher incidence of road kill if traffic volumes increase along the roadway

Increased traffic volumes will not be as great for Alternative 6 as they would be for Alternatives 2-5.

The benefit to riparian areas along the roadway versus damage to timbered areas if alignment changes are made at the Naylor Lake/Guanella Pass Campground area

The realignments proposed in the DEIS are no longer being actively pursued.

The effects of winter closure on the roadway and the cost of maintenance

Clear Creek County, Park County, and the FS would decide winter closure with input from the Town of Georgetown.

The need for a lower impact alternative, with potential for new surface treatments as an alternative to asphalt

Wildlife, traffic, and construction impacts will not be as great for Alternative 6 as for Alternatives 2-5 due to less reconstruction, a narrower roadway, and less impact from rehabilitation as opposed to reconstruction. Alternative surface treatments are under consideration for Alternative 6 as an alternative to asphalt but without the environmental consequences of a gravel surface.

1b. The Town of Georgetown

Public support of winter closure to reduce maintenance costs

Clear Creek County, Park County, and the FS would decide winter closure with input from the Town of Georgetown.

Long-term and construction impacts to the Town of Georgetown

Construction impacts will not be as great for Alternative 6 as they would be for Alternatives 2-5 because of a shorter construction period, proposed use of local material sources for aggregate materials, more rehabilitation work, and a narrower roadway width.

Public support of a rehabilitation alternative

Alternative 6 proposes more rehabilitation (63% of the total road length) than Alternatives 2-5.

The potential for the road to become a popular linkage from I-70 to US 285 if improvements are made to the roadway

Potential for the road to become a popular linkage between I-70 and US 285 will not be as great under Alternative 6 because of the reclassification of the roadway from a rural collector road to a rural local road, which allows a narrower width, slower design speed, and closer adherence to the existing winding alignment.

The inability of the Town of Georgetown to sustain a 224 percent increase in traffic and seven to ten years of heavy construction

Under Alternative 1 (No Action), traffic volumes are predicted to increase 56% over 1995 volumes by the year 2025. Traffic volumes for Alternative 6 are predicted to increase 88% over 1995 volumes by the year 2025. Construction impacts will not be as great for Alternative 6 as for Alternatives 2-5 because of a shorter construction period, proposed use of local material sources for aggregate materials, more rehabilitation work, and a narrower roadway width.

Visual impacts to the GSPNHLD

Visual impacts to the GSPNHLD will not be as great for Alternative 6 as for Alternatives 2-5.

Higher traffic volumes might result in increased income for the Town of Georgetown, but only if parking is available and only after the construction has been completed

Construction for Alternative 6 will be of a shorter duration than for Alternatives 2-5, and will be phased to reduce traffic congestion.

Inadequate discussion in the DEIS of the construction impacts on the Town of Georgetown

A more thorough discussion of the construction impacts on Georgetown is presented in the SDEIS and FEIS.

The effect of the terminus on the cultural resources on Rose Street, the Farwell Mill Site, and Loop Drive / Changes to the roadway within the town limits of Georgetown should be decided by the Town of Georgetown

A proposed construction haul route, including construction of a permanent bridge at 7th street, was developed in conjunction with Georgetown to reduce impacts to the town resources. The Georgetown realignment option discussed in the DEIS is not included in Alternative 6.

2. Continuing Coordination

Coordination on improvements to Guanella Pass Road continues between the FHWA and the agencies, and will continue throughout final design and construction. The following coordination (at a minimum) will take place during final design and construction:

- If requested, the FHWA will coordinate information workshops or onsite field reviews on final design elements including guardrail used, cut and fill walls, revegetation specifications, and traffic control during construction.

- A field review with the cooperating agencies will be conducted once road design plans are 70 percent complete.

- The cooperating agencies will be provided the opportunity to review, comment on, and sign-off on the plans, specifications, and estimates (PSE) package for the proposed road construction. If any of the jurisdictional agencies refuse to sign the PSE package, then there will be no project on land under that agency's jurisdiction.

- Once the construction contract is awarded the cooperating agencies will enter into a partnering agreement with the construction contractor to further identify areas of concern and how they would be addressed.

- The FHWA will have a Project Engineer with an office on-site to address questions and concerns.

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